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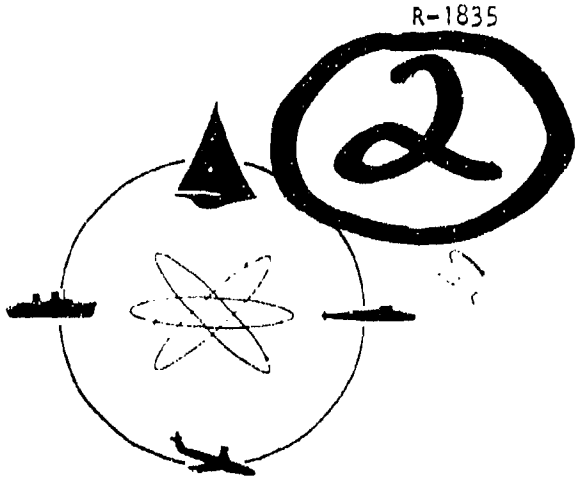

DAVIDSON LABORATORY

REPORT SIT-DL-76-1835
September 1976

AN EXPERIMENTAL STUDY OF PLANING SURFACES OPERATING IN SHALLOW WATER

by

Christopher J. Reyling

Prepared for
Code 03221 of Naval Sea Systems Command
under
Office of Naval Research
Contract N00014-75-C-1145
(DL Project 4300/173)

STEVENS INSTITUTE OF TECHNOLOGY
CASTLE POINT STATION
HOBOKEN, NEW JERSEY 07030

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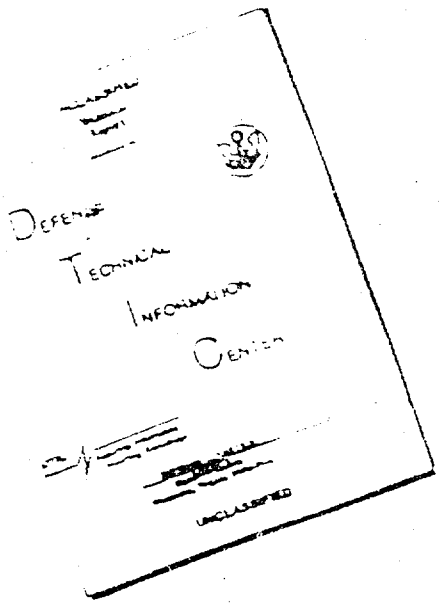

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REPORT DOCUMENTATION PAGE

READ INSTRUCTIONS BEFORE COMPLETING FORM

(14) 1. REPORT NUMBER: SIT-DL-76-1835

2. GOVT ACCESSION NO.

3. RECIPIENT'S CATALOG NUMBER (9)

(6) 4. TITLE (and Subtitle): AN EXPERIMENTAL STUDY OF PLANING SURFACES OPERATING IN SHALLOW WATER

5. TYPE OF REPORT & PERIOD COVERED: FINAL REPORT, Apr 1975 — Sept 1976

6. PERFORMING ORG. REPORT NUMBER

(10) 7. AUTHOR(s): Christopher J. Reyling

(15) 8. CONTRACT OR GRANT NUMBER(s): N0014-75-C-1145

9. PERFORMING ORGANIZATION NAME AND ADDRESS
Davidson Laboratory
Stevens Institute of Technology
Castle Point Station, Hoboken, NJ 07030

(14) 10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS: 63586N; Special Warfare Craft, S3820; 1140-003

11. CONTROLLING OFFICE NAME AND ADDRESS
David Taylor Naval Ship Research and Development Center, Code 114
Bethesda, MD 20084

(11) 12. REPORT DATE: September 1976

13. NUMBER OF PAGES: 10 pages, 2 tables, 22 figs.

14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office)
Office of Naval Research
800 N. Quincy Street
Arlington, VA 22217

(12) 62p.

15. SECURITY CLASS. (of this report): UNCLASSIFIED

15a. DECLASSIFICATION/DOWNGRADING SCHEDULE

16. DISTRIBUTION STATEMENT (of this Report)

APPROVED FOR PUBLIC RELEASE; DISTRIBUTION UNLIMITED

17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)

18. SUPPLEMENTARY NOTES

19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

Shallow Water Planing, Hydrodynamics
Prismatic Surfaces, Marine Craft

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

The results of hydrodynamic model tests of prismatic planing surfaces operating in shallow water are presented. Empirical analysis is shown resulting in predictions of lift, resistance and pitch moment for a 10 and 20 degree deadrise surface.

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Approved

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P. Ward Brown, Manager
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CONTENTS

NOMENCLATURE

Throughout this report all the measured quantities are normalized with respect to the beam and expressed in the following coefficients:

C_Δ	load coefficient, Δ/wb^3
C_R	resistance coefficient, R/wb^3
C_M	moment coefficient, M/wb^4
C_V	speed coefficient, $v/\sqrt{gb}$
λ	mean wetted length, S/b^2, beams
λ_C	chine wetted length, beams
λ_K	keel wetted length, beams
Z'	clearance under transom, beams
D'	water depth, beams

where

b	beam of planing surface, ft
Δ	lift, vertical component of resultant force, lb
R	drag, horizontal component of resultant force, lb
M	moment of the resultant force about a point on the keel line at the transom, ft-lb
v	horizontal velocity, fps
S	projected wetted area bounded by the stagnation line, chines and transom measured in a plane which is normal to the centerplane and contains the keel, sq.ft.
w	specific weight of water, lb per cu.ft.
g	acceleration due to gravity, fps^2

Also

C_L lift coefficient, $\Delta/\frac{1}{2}\rho v^2b^2 = 2 C_\Delta/C_v{}^2$

C_D drag coefficient, $R/\frac{1}{2}\rho v^2b^2 = 2 C_R/C_v{}^2$

C_m moment coefficient, $M/\frac{1}{2}\rho v^2b^3 = 2 C_M/C_v{}^2$

C_f Schoenherr turbulent skin friction coefficient,

$$\log (C_f Re) = .242/\sqrt{C_f}$$

Re Reynolds Number, $\lambda C_v \sqrt{gb^3}/\nu$

β deadrise angle, angle of a line joining the keel to the lowest point of the chine (including a spray strip if fitted) measured in the transverse plane, degrees

τ trim angle, angle between the keel and the horizontal, degree

ρ mass density of water, slugs per cu.ft.

ν kinematic viscosity of water, ft^2/sec

∞ infinite depth of water

(see Figure 2 for definition sketch)

INTRODUCTION

The design of planing boats for smooth-deep-water applications has been studied extensively, so that today a good deal of information is available[1,2,3]. But with power boats traveling rivers, estuaries, and shore lines, there is need for additional information on the shallow-water mode of operation. Christopher[4] provides data for a flat-bottom planing surface at high speed coefficients including variations in trim, wetted length and water depth. The results point up the contrasting behavior of planing craft in shallow and in deep water. Toro[5] and Yonkers[6] have made shallow-water tests on specific planing hulls over a complete speed range. Their findings indicate significant increases in trim, draft and resistance at speeds equal to or less than the critical speed ($\sqrt{gD}$), but at supercritical speeds, there is appreciable reduction in resistance and draft compared to deep water. Thus while some experiments have been carried out, they have either been outside the range of practical planing-boat operation (e.g. at very high speed coefficients or with zero deadrise) or been related to specific planing hull designs.

The purpose of this study was to investigate the planing characteristics of prismatic surfaces operating in a finite depth of smooth water. The major effort was an experimental test program in which trim, wetted length, speed, deadrise and depth-of-water were varied. Analysis was performed on the resulting data in an attempt to rationalize the effect of water depth on the lift, drag and pitch moment of a prismatic planing hull.

The experiments were conducted in Davidson Laboratory's high speed towing facility during June and August 1975.

MODELS

Two prismatic planing surface models having deadrise angles of 10 and 20 degrees were used in this investigation. Each had a beam of 0.75 feet and a length of 4.0 beams. The models were constructed of 3/8 inch thick plexiglass with a slot machined in the sides 1/32 inch above the chine, 3/8 inch wide by 1/10 inch deep, to insure good flow separation (see Figure 2). Section lines were painted on the bottom at 1 inch spacing for the purpose of measuring wetted length. The planing surface models were mounted on a rigid aluminum support frame, with provision for trim adjustment. The trim (and moment) axis was 2.111 beams forward of the transom and 0.944 beams above the keel. A photograph of the model and test setup is shown in Figure 1.

APPARATUS AND TEST PROCEDURE

The models were set up for testing in Tank 3 using the "1000 lb balance". This balance had a capacity in lift, drag and pitching moment of 1000 lb, 500 lb and 250 ft-lb respectively. Loads applied to the balance produced deflections which were sensed by linear differential transformers. An electronic inclinometer mounted in the model, was used to set and measure the trim angle. The signals from the transducers were relayed by cable to a data station on shore, where they were filtered (40 Hz low pass) and processed on-line by a PDP-8e Computer using an analog-to-digital converter. The results were printed out on a teletype and were also stored on a digital magnetic tape. All channels were monitored on an oscillograph.

The draft of the model was adjusted and set by means of jack screws. By adjusting the draft, the running mean wetted length was held constant at discrete levels during changes of speed and trim. A false bottom, extending for 104 feet, was constructed of marine plywood and set to

an accuracy of ± 1/8 inch in the tank at the nominal shallow water depth. The bottom extended to within 2 feet of the tank walls at each side to provide some pressure relief, thereby reducing the narrow channel effect that would otherwise occur if the bottom extended to the sides of the tank. Once the depth was set initially, it was changed by lowering the water level in the tank.

Underwater pictures were taken by a "Polaroid" camera, through a large plexiglass window in the false bottom. This allowed measurement of the keel and chine wetted lengths. An example of the results obtained with this technique is shown in Figure 3.

Data were taken over a 50 foot distance of the false bottom, with the model at constant speed. A pulse generated at the beginning and end of this prescribed distance was used to compute the speed and control the data-taking by the PDP-8e on-line computer.

TEST PROGRAM

The 10 degree deadrise prismatic surface was tested at discrete values of water depth.

$$D' = 1.5,\ 1.2,\ 0.9,\ 0.33 \text{ beams}$$

over the following values of speed, trim and wetted length

$$C_V^2 = 1,5,10,15,20,25$$
$$\tau = 2,4,6,8 \text{ degrees}$$
$$\lambda = 1,2,3,3.5 \text{ beams}$$

The above matrix was repeated for the 20 degree deadrise model at a water depth of $D' = 1.2$ beams.

It became apparent upon an examination of the data that the test program would have to be expanded using the clearance under the transom keel as a parameter rather than the water depth. Since the 20 degree deadrise model was following the same trends as the 10 degree model, this later matrix at clearances of

$Z' = 0.50, 0.25, 0.10, 0.05$ beams

was run only with the lower deadrise prismatic surface.

Additional data was taken at higher speeds, up to $C_V = 50$, for $\tau = 8^\circ$, $\lambda = 3.0$ beams, and $Z' = 0.10$ beams.

DATA REDUCTION

The instrumentation was calibrated by applying known angles to the inclinometers, and known loads and moments to the three component balance. All calibrations were linear and the computed calibration rates were spot-checked daily.

The test results were computed from the differences between transducer outputs in the running and zero conditions. Prior to running, zeros were taken on all channels, except the model inclinometer, with the model suspended above the water at the trim to be run. The inclinometer was mounted in the model, so as to read absolute trim.

Aerodynamic tares were determined by towing the model just above the water surface at various trims and speeds. Only the drag was greatly affected by air flow, and this tare has been removed from the data.

The pitch moment measured by the balance was centered at the trim axis, and has been transferred to the transverse axis through the transom-keel point by the following formula:

$$C_M = C_{MG} + C_\Delta [x \cos\tau - y \sin\tau] + C_R [x \sin\tau + y \cos\tau]$$

where: C_{MG} = moment coefficient about the balance trim axis
x = longitudinal distance from the transom to the trim axis
y = vertical distance from the keel to the trim axis

The mean wetted length was computed as equal to the average of the keel and chine wetted lengths plus an allowance for the stagnation line curvature, i.e.:

$$\lambda = 0.5 (\lambda_K + \lambda_C) + 0.03$$

See Reference 2.

RESULTS

The results of the tests of the 10° deadrise surface are presented in Table 1 and the results of the 20° deadrise surface in Table 2. These data are ordered by trim, wetted length and depth of water. At each of these conditions the results are listed in order of speed. The tabulated quantities include trim, the mean, keel and chine wetted lengths, speed coefficient squared, lift, drag, and pitching moment coefficients, the clearance under the transom, and the water depth.

For the 10 degree deadrise surface, plots of selected conditions are presented for lift, resistance and pitch moment, in Figures 4 through 19. The 20 degree deadrise surface is compared with the 10 degree surface in Figures 20 to 22. Results predicted for the infinite or deep water case[1] are also included in the presentation as a basis for the analysis which follows.

The results have also been stored on magnetic tape suitable for computer input. Consequently, any alternative listing or analysis of the data may be readily produced.

PRECISION

From the repeat runs available and from a general knowledge of the apparatus, the precision of the data is estimated to be:

Trim	± .01 degree
Wetted length	± .01 beam
C_{Δ}	± .02
C_R	± .02
C_M	± .02
* Z'	± .02 beam
* D'	± .02 beam

*While the draft settings could be made by accurate micrometer adjustment, the false bottom panels in the tank are estimated to be within ± 1/8 inch of a mean line relative to the free surface.

DISCUSSION AND ANALYSIS

The experimental data on prismatic planing hulls in deep water has been thoroughly treated by Brown[1] and Savitsky[3]. Both sets of results are incorporated in Reference 1 where comparable plots of the lift, drag and pitch moment are plotted against C_v^2. Linearities of these quantities up to $C_v^2 = 50$ is noted. Because these infinite depth results (denoted by subscript ω) are important to and closely allied with the present shallow water results, the expressions of Brown[1] are reproduced below.

Lift:

$$C_{L_\omega} = (\pi/4)\sin 2\tau\cos\tau\left[(1-\sin\beta)\lambda/(1+\lambda)+(1.33/\pi)\lambda\sin 2\tau\cos\beta+0.4\sec\tau(\lambda/C_v)^2\right] \quad (1)$$

Drag:

$$C_{D_\omega} = C_{L_\omega}\tan\tau + C_f\,\lambda/\cos\tau\,\cos\beta \quad (2)$$

Pitch Moment:

$$C_{M_\omega} = (\pi/4)\lambda\sin 2\tau\left[(.875\lambda - .08\tan\beta/\tan\tau)(1-\sin\beta)/(1+\lambda) + (1.33/2\pi)\lambda\sin 2\tau\cos\beta + .133\sec\tau(\lambda/C_v)^2\right] \quad (3)$$

The fundamental property of a planing surface is the lift it generates, because its other properties - the drag and moment - are essentially functions of the lift. The lift on a planing surface can be attributed to two separate effects - one due to the dynamic pressure of the water against the moving surface and the other ascribable to the hydrostatic pressure associated with a given hull draft and attitude. Thus the lift on a planing surface is said to be made up of dynamic and static components:

$$C_\Delta = C_{\Delta_D} + C_{\Delta_S} \quad (4)$$

By definition the dynamic lift varies as the square of the speed and the static lift is invariant with speed, so that for given wetted length and trim

$$C_{\Delta} = m\, C_v^2 + C_{\Delta_S}, \qquad (\lambda,\tau) = \text{constant} \tag{5}$$

The static component can be found by plotting the lift against the square of the speed, as suggested by Eq. (5), where the static lift may be found as the intercept on the lift axis. This latter quantity was found to be independent of water depth.

The present results in shallow water, when plotted against C_v^2, are linear up to $C_v^2 = 20$ and from $C_v^2 = 30$ to 50 with a slightly higher slope (see Figures 10, 12 and 19). A non-linear transition between $C_v^2 = 20$ and $C_v^2 = 30$ was observed and confirmed by many repeat and check runs. No rational explanation has been found for this behavior. Since most planing hulls operate at or below $C_v^2 = 20$, the remaining analysis is confined to this speed range with direct applicability to existing designs.

The data, both tabular and in graph form, are presented to show the effect of trim, mean wetted length and water depth on the lift, drag, and pitch moment of a prismatic planing hull. Analysis of the data, using the depth of water as the depth parameter, resulted in a rather weak effect of shallow water so that trends were obscured. It was found that at a given depth of water, a pronounced shallow water effect was evident at large trim and wetted length but that in the same depth of water, very little effect was apparent at small trim and wetted length, compared to deep water. This trend is explainable by virtue of the fact that at high trim and wetted length a greater proportion of the hull is close to the tank bottom. In order to bring out the depth effect more clearly, additional tests were made with the water clearance under the transom held constant. Although these results indicated stronger shallow water effects, traditional methods of plotting the data could not collapse the data with trim and wetted length.

Typical procedures for analyzing shallow water data are to compare the finite depth results with the infinite depth results, using the

reciprocal of the depth parameter to point up the water depth effect. In this way the extrapolation to infinite depth (reciprocal goes to zero) can be easily made by noting the intercept. Since this technique failed to reduce the data using both the water depth and hull clearance as depth parameters, a strictly empirical approach was taken. The expression for the dynamic component of the lift was found to vary as

$$C_{L_D} = C_{L_{D_\infty}} \left(1 + \frac{0.21}{Z' + \sin\tau}\right) \tag{6}$$

This relation holds for the 10 and 20 degree deadrise hulls at speeds up to $C_V^2 = 20$, all mean wetted lengths from 1 to 3.5 beams, all hull clearances and test trim angles of 4, 6 and 8°. The collapse of the data is illustrated in Figure 4. Also shown in Figures 5 through 10 are selected plots of lift versus speed squared, comparing Eq. (6) with the data.

The significance of this equation is in the term $(Z' + \sin\tau)$ which represents the water clearance under the hull, one beam forward of the transom. If this quantity is held constant then the ratio of the dynamic lift at finite water depth to that at infinite depth is a constant, regardless of the trim, speed, wetted length and depth of water. The lift ratio varies linearly with $1/(Z' + \sin\tau)$; the infinite depth lift is recovered in deep water; and the lift in shallow water is finite for a given trim as the hull clearance goes to zero.

The two degree trim data is not included in the lift analysis because the data fell consistently under the trend predicted by Eq. (6). This does not limit the applicability however since most planing hulls do not operate at this low trim. Other planing hull data taken at infinite depth[3] shows the low trim data to be similarly inconsistent with the bulk of data taken at more realistic trims.

Analysis of the drag data at finite water depth confirmed the relationship found between lift and drag at infinite depth. That is, Eq. (2) is equally valid for the drag at finite water depth, if the lift developed at finite depth is correspondly used. Equation (2) can also

be expressed in the form

$$C_R = C_\Delta \tan\tau + C_f \lambda C_v^2/2 \cos\tau \cos\beta \quad (7)$$

This equation is compared with the shallow water data in Figure 11 at a given speed, trim and wetted length for eight values of hull clearance. Figure 12 compares the drag data with Eq. (7) using the total lift from Eq. (6).

The depth parameter $Z' + \sin\tau$ was also instrumental in collapsing the pitch moment data. Empirically it was found that the dynamic component reduced to:

$$C_{M_D} = C_{M_{D\infty}} \left(\frac{0.124/\lambda + 0.116}{Z' + \sin\tau} + 1\right) \quad (8)$$

The formula includes a small correction for wetted length in the numerator. The suitability of Eq. (8) in describing the moment data is illustrated in Figure 13 for all test parameters excluding again the 2^o trim data. In Figures 14 through 19, selected plots of moment versus C_v^2 are shown, comparing Eq. (8) with the raw data.

The lift, drag and pitching moment data for the 10 and 20 degree deadrise surfaces are compared in Figures 20 to 22 at one water depth, $D' = 1.2$, over the range of test speeds, trims and wetted lengths. The ratio of the forces and moment to the infinite depth case, shown by the straight line, are identical for either model. It is on this basis that the empirical results herein obtained are equally applicable for other deadrise surfaces.

CONCLUDING REMARKS

An empirical analysis of the hydrodynamic characteristics of 10 and 20 degree deadrise prismatic planing surfaces operating in shallow water has been made, resulting in expression for the shallow water planing lift, drag and pitching moment. The effect of operation in shallow water is to modify the dynamic components of the previously developed[1] expressions for the deep water planing characteristics. The selection of an appropriate depth parameter was not obvious and two parameters were used in the experimental phase of this study, including: the depth below the free water surface and the depth-beam ratio Z' below the transom. It was determined by subsequent analysis that the depth below a point one beam forward of the transom, $Z' + \sin\tau$, was the appropriate depth parameter.

The shallow water planing equations are summarized below in terms of the corresponding deep-water characteristics.

Lift

$$C_L = \left[C_{L_\infty} - 0.3 \sin 2\tau (\lambda/C_V)^2\right] \left(1 + \frac{0.21}{Z' + \sin\tau}\right) + 0.3 \sin 2\tau (\lambda/C_V)^2$$

Drag

$$C_D = C_L \tan\tau + C_f \lambda/\cos\tau\cos\beta$$

Moment

$$C_M = \left[C_{M_\infty} - .2 \lambda \sin\tau (\lambda/C_V)^2\right] \left(1 + \frac{0.124/\lambda + 0.116}{Z' + \sin\tau}\right) + .2 \lambda \sin\tau (\lambda/C_V)^2$$

In the above equations the deep water characteristics are denoted by subscript ∞ and Z' is the depth under the transom in beams.

The application of these equations has been demonstrated for the following ranges:

$$1 < C_v < 5, \quad 1 < \lambda < 4, \quad \beta \leq 20, \quad 4 \leq \tau \leq 10, \quad z' \geq 0.05$$

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TABLE 1
DEADRISE = 10 DEGREES

TRIM = 2 DEGREES
MEAN WETTED LENGTH = 1.0 BEAM

RUN	τ	λ	λ_k	λ_c	C_V^2	C_Δ	C_R	C_M	Z'	D
994	1.98	1.06	1.57	0.49	1.00	0.06	-0.005	0.07	0.05	0.11
995	1.99	1.00	1.54	0.40	4.99	0.19	0.010	0.17	0.05	0.11
996	1.98	1.03	1.59	0.41	10.00	0.35	0.024	0.29	0.05	0.11
997	2.00	0.99	1.54	0.38	14.98	0.49	0.038	0.39	0.05	0.11
998	2.04	0.90	1.46	0.28	20.04	0.63	0.050	0.48	0.05	0.11
999	2.02	0.92	1.49	0.29	20.00	0.65	0.054	0.51	0.05	0.11
1000	1.95	1.01	1.58	0.39	24.99	0.87	0.075	0.71	0.05	0.11
970	1.99	1.03	1.56	0.44	1.00	0.03	0.001	0.02	0.11	0.16
971	2.00	0.89	1.46	0.27	4.99	0.12	0.012	0.08	0.11	0.16
972	1.96	1.00	1.57	0.37	10.00	0.26	0.023	0.19	0.11	0.16
973	1.98	0.99	1.56	0.36	15.00	0.38	0.038	0.29	0.11	0.16
974	1.98	0.91	1.48	0.28	20.04	0.50	0.045	0.38	0.11	0.16
975	1.97	0.96	1.54	0.32	24.99	0.62	0.065	0.46	0.11	0.16
875	1.96	0.94	1.54	0.28	1.00	0.03	-0.007	0.05	0.25	0.31
876	1.98	1.00	1.60	0.33	5.00	0.09	0.005	0.08	0.25	0.31
877	2.00	1.01	1.63	0.33	10.00	0.20	0.024	0.19	0.25	0.31
878	2.02	1.06	1.66	0.41	14.98	0.30	0.033	0.28	0.24	0.31
879	2.02	1.03	1.62	0.38	20.00	0.39	0.042	0.37	0.25	0.31
880	1.93	1.06	1.68	0.38	24.99	0.44	0.052	0.38	0.25	0.31
503	1.99	1.03	1.67	0.33	1.00	0.06	0.001	0.08	0.27	0.33
504	2.03	1.02	1.64	0.34	5.00	0.12	0.017	0.14	0.27	0.33
492	1.98	0.91	1.58	0.19	9.99	0.16	0.022	0.17	0.27	0.33
495	2.00	1.00	1.66	0.28	10.00	0.19	0.028	0.20	0.27	0.33
496	2.01	1.09	1.74	0.38	15.00	0.29	0.041	0.31	0.27	0.33
497	2.03	1.02	1.66	0.32	15.00	0.28	0.041	0.30	0.27	0.33
498	2.02	0.91	1.56	0.21	20.00	0.33	0.044	0.31	0.27	0.33
500	2.02	0.97	1.72	0.16	20.04	0.29	0.046	0.29	0.26	0.33
501	2.00	1.05	1.74	0.30	24.99	0.42	0.058	0.41	0.26	0.33
703	1.98	1.04	1.69	0.33	1.00	0.03	0.004	0.01	0.49	0.56
706	2.00	0.95	1.59	0.26	5.00	0.09	0.018	0.07	0.50	0.56
707	2.00	0.97	1.60	0.28	10.00	0.16	0.026	0.12	0.50	0.56
708	2.01	1.05	1.67	0.36	15.00	0.25	0.043	0.23	0.49	0.56
710	2.02	1.00	1.63	0.31	20.04	0.31	0.050	0.25	0.50	0.56
711	2.02	0.96	1.61	0.24	24.99	0.38	0.062	0.30	0.50	0.56
117	2.01	1.00	1.86	0.09	1.00	0.07	0.010	0.00	1.43	1.50
118	2.01	1.09	1.78	0.34	5.00	0.11	0.025	0.04	1.43	1.50
119	2.01	1.04	1.74	0.27	5.00	0.10	0.023	0.02	1.44	1.50
120	1.99	0.98	1.69	0.21	10.02	0.16	0.032	0.08	1.44	1.50
121	1.98	1.03	1.74	0.26	15.02	0.23	0.044	0.15	1.43	1.50
122	1.99	1.06	1.81	0.26	20.00	0.29	0.054	0.22	1.43	1.50
124	2.06	0.95	1.64	0.20	25.04	0.32	0.066	0.23	1.43	1.50

TABLE 1-2

TRIM = 2 DEGREES
MEAN WETTED LENGTH = 2.0 BEAMS

RUN	τ	λ	λ_k	λ_c	C_v^a	C_Δ	C_R	C_M	Z'	D
986	1.99	1.93	2.42	1.38	1.00	0.11	0.005	0.13	0.05	0.14
987	2.00	2.02	2.57	1.41	4.99	0.30	0.028	0.38	0.05	0.14
989	1.99	2.12	2.68	1.50	10.00	0.55	0.055	0.73	0.05	0.14
990	1.96	1.91	2.48	1.28	10.00	0.50	0.045	0.62	0.05	0.14
991	1.97	2.01	2.59	1.38	15.00	0.77	0.077	1.03	0.05	0.14
992	2.02	1.95	2.53	1.30	20.04	1.01	0.101	1.35	0.05	0.14
993	1.96	2.00	2.57	1.37	24.99	1.26	0.134	1.72	0.04	0.14
949	1.99	1.94	2.43	1.38	1.00	0.10	0.001	0.11	0.11	0.19
950	1.99	2.03	2.59	1.41	4.99	0.24	0.025	0.31	0.10	0.19
522	1.99	1.91	2.54	1.21	10.00	0.33	0.051	0.46	0.10	0.19
523	1.98	2.02	2.67	1.31	10.00	0.34	0.053	0.49	0.09	0.19
951	1.99	2.00	2.57	1.38	9.99	0.42	0.048	0.56	0.10	0.19
524	1.96	2.00	2.64	1.30	15.00	0.48	0.073	0.69	0.09	0.19
952	1.99	2.01	2.58	1.39	14.98	0.62	0.071	0.85	0.10	0.19
525	1.97	2.05	2.69	1.36	20.00	0.65	0.098	0.96	0.09	0.19
953	1.99	1.94	2.52	1.29	20.04	0.80	0.098	1.10	0.10	0.19
526	1.98	2.06	2.71	1.36	24.99	0.79	0.121	1.18	0.09	0.19
954	1.99	2.01	2.59	1.37	25.04	0.98	0.124	1.36	0.09	0.19
506	1.99	2.07	2.72	1.37	10.00	0.28	0.045	0.39	0.23	0.33
507	1.96	2.02	2.64	1.34	15.00	0.42	0.066	0.59	0.23	0.33
508	1.98	2.00	2.63	1.31	20.00	0.54	0.085	0.78	0.23	0.33
509	1.99	1.96	2.59	1.27	24.99	0.67	0.106	0.97	0.23	0.33
846	2.01	1.99	2.48	1.44	1.00	0.10	0.004	0.12	0.25	0.34
847	2.03	1.98	2.57	1.33	5.00	0.20	0.023	0.27	0.25	0.34
848	2.02	2.00	2.59	1.34	10.00	0.31	0.043	0.43	0.25	0.34
849	1.98	2.00	2.60	1.33	14.98	0.46	0.068	0.68	0.25	0.34
850	2.05	2.00	2.59	1.36	20.00	0.61	0.094	0.90	0.25	0.34
851	2.01	1.97	2.57	1.32	24.99	0.74	0.120	1.08	0.25	0.34
682	1.99	2.05	2.58	1.46	1.00	0.09	0.000	0.10	0.50	0.59
683	2.00	1.93	2.56	1.24	5.00	0.17	0.018	0.22	0.50	0.59
684	2.00	2.00	2.61	1.32	5.00	0.17	0.018	0.23	0.50	0.59
685	2.00	2.02	2.64	1.33	10.00	0.28	0.036	0.40	0.49	0.59
686	1.99	2.01	2.63	1.33	15.00	0.38	0.052	0.56	0.49	0.59
687	2.01	2.02	2.66	1.33	20.04	0.49	0.076	0.76	0.49	0.59
688	2.00	1.97	2.58	1.31	25.04	0.58	0.096	0.86	0.49	0.59
130	2.00	1.91	2.69	1.07	1.00	0.12	0.004	0.27	1.40	1.50
131	2.01	2.02	2.79	1.20	4.55	0.17	0.000	0.39	1.40	1.50
132	2.01	2.00	2.69	1.24	5.00	0.21	0.023	0.45	1.40	1.50
133	1.99	1.99	2.69	1.22	10.00	0.30	0.042	0.62	1.40	1.50
134	1.94	1.98	2.67	1.23	15.00	0.31	0.057	0.50	1.40	1.50
136	1.99	1.90	2.59	1.14	20.04	0.39	0.074	0.61	1.40	1.50
137	1.99	1.99	2.70	1.22	20.04	0.40	0.076	0.65	1.40	1.50
138	1.99	2.09	2.81	1.30	24.99	0.48	0.098	0.78	1.40	1.50
139	1.99	1.96	2.64	1.21	24.99	0.47	0.098	0.75	1.40	1.50

TABLE 1-3

TRIM = 2 DEGREES
MEAN WETTED LENGTH = 3.0 BEAMS

RUN	τ	λ	λ_k	λ_c	C_v [a]	C_Δ	C_R	C_M	Z'	D
961	1.99	3.07	3.54	2.54	1.00	0.23	0.011	0.33	0.04	0.18
962	1.99	3.04	3.60	2.42	4.99	0.44	0.041	0.75	0.04	0.18
965	1.98	3.05	3.62	2.42	10.00	0.69	0.078	1.22	0.04	0.18
966	1.97	2.97	3.56	2.32	15.00	0.96	0.110	1.71	0.04	0.18
967	1.97	3.05	3.64	2.40	20.04	1.32	0.149	2.41	0.03	0.18
968	1.97	2.96	3.56	2.30	25.04	1.56	0.185	2.82	0.04	0.18
517	2.00	2.86	3.46	2.20	10.00	0.53	0.076	0.98	0.06	0.19
518	1.99	3.10	3.74	2.40	10.00	0.55	0.080	1.04	0.07	0.19
519	1.98	2.97	3.60	2.28	15.00	0.73	0.108	1.41	0.06	0.19
520	1.99	3.04	3.68	2.34	20.00	0.93	0.143	1.84	0.05	0.19
521	1.99	3.04	3.70	2.31	24.94	1.14	0.171	2.24	0.05	0.19
916	2.03	2.97	3.43	2.46	1.00	0.21	0.009	0.30	0.09	0.23
917	1.99	3.03	3.60	2.40	4.99	0.37	0.039	0.62	0.08	0.23
918	1.99	3.01	3.58	2.38	9.99	0.57	0.066	1.05	0.08	0.23
919	2.03	2.97	3.54	2.34	14.98	0.83	0.099	1.56	0.08	0.23
920	2.01	3.07	3.66	2.42	20.04	1.06	0.131	2.06	0.08	0.23
921	1.99	2.97	3.57	2.31	24.99	1.25	0.164	2.41	0.08	0.23
510	1.97	3.01	3.66	2.31	10.00	0.45	0.068	0.94	0.20	0.33
511	1.96	2.98	3.62	2.28	15.00	0.63	0.090	1.37	0.19	0.33
512	2.00	3.09	3.74	2.37	20.00	0.80	0.116	1.81	0.19	0.33
513	2.00	3.00	3.66	2.28	20.00	0.79	0.108	1.75	0.19	0.33
514	2.06	3.00	3.67	2.27	24.99	0.96	0.136	2.13	0.19	0.33
818	2.05	2.97	3.42	2.46	1.00	0.19	0.014	0.24	0.25	0.38
820	2.04	3.01	3.56	2.40	5.00	0.32	0.044	0.51	0.24	0.38
821	2.04	3.04	3.61	2.41	10.00	0.46	0.070	0.83	0.24	0.38
822	2.02	2.97	3.56	2.32	15.00	0.60	0.094	1.13	0.24	0.38
823	2.03	3.03	3.63	2.37	20.00	0.78	0.126	1.57	0.24	0.38
824	2.04	2.96	3.56	2.31	24.99	0.93	0.154	1.88	0.24	0.38
662	1.99	2.98	3.47	2.43	1.00	0.11	0.015	0.23	0.50	0.63
663	1.99	2.93	3.56	2.24	5.00	0.21	0.044	0.41	0.49	0.63
664	1.99	3.02	3.64	2.33	10.05	0.32	0.070	0.67	0.49	0.63
665	2.00	3.00	3.62	2.31	15.00	0.43	0.095	0.92	0.49	0.63
666	2.02	2.97	3.59	2.30	20.00	0.56	0.127	1.22	0.49	0.63
667	2.00	3.06	3.69	2.37	25.04	0.69	0.159	1.53	0.48	0.63
140	1.98	2.95	3.68	2.17	1.00	0.16	0.008	0.22	1.37	1.50
141	1.99	3.04	3.70	2.31	5.00	0.26	0.038	0.43	1.37	1.50
142	1.98	2.97	3.67	2.21	10.00	0.34	0.063	0.65	1.37	1.50
143	1.99	2.99	3.68	2.23	15.02	0.44	0.089	0.90	1.36	1.50
144	2.01	3.04	3.77	2.26	20.04	0.52	0.114	1.12	1.36	1.50
146	2.01	3.01	3.72	2.23	24.99	0.61	0.137	1.31	1.36	1.50

TABLE 1-4

TRIM = 4 DEGREES
MEAN WETTED LENGTH = 1.0 BEAM

RUN	τ	λ	λ_k	λ_c	C_V^2	C_Δ	C_R	C_M	Z'	D
976	3.99	0.98	1.23	0.67	1.00	0.09	0.003	0.09	0.06	0.14
977	4.00	1.02	1.29	0.70	5.00	0.36	0.032	0.28	0.06	0.14
978	3.95	0.99	1.24	0.67	10.00	0.66	0.056	0.47	0.06	0.14
979	3.96	0.91	1.17	0.59	14.98	0.94	0.085	0.64	0.06	0.14
983	3.94	1.08	1.34	0.76	14.98	1.10	0.093	0.86	0.05	0.14
984	3.93	1.01	1.27	0.69	20.04	1.38	0.119	1.02	0.05	0.14
985	3.92	0.99	1.26	0.66	25.04	1.61	0.151	1.14	0.05	0.14
939	3.99	1.06	1.32	0.74	1.00	0.07	0.002	0.07	0.11	0.19
941	4.00	1.02	1.29	0.69	4.99	0.29	0.024	0.23	0.11	0.19
942	3.97	0.98	1.24	0.66	10.00	0.55	0.046	0.41	0.11	0.19
943	3.97	1.05	1.32	0.71	15.00	0.86	0.073	0.70	0.10	0.19
945	3.97	1.01	1.28	0.69	20.04	1.12	0.100	0.91	0.10	0.19
946	4.00	0.98	1.26	0.64	20.00	1.10	0.101	0.86	0.10	0.19
948	3.94	0.98	1.26	0.64	24.99	1.36	0.134	1.07	0.10	0.19
446	3.97	1.03	1.33	0.67	10.00	0.35	0.036	0.22	0.23	0.33
447	3.96	1.04	1.33	0.68	15.00	0.55	0.055	0.38	0.23	0.33
448	3.97	1.06	1.34	0.72	20.00	0.76	0.081	0.53	0.23	0.33
451	3.98	1.04	1.33	0.68	24.99	0.90	0.102	0.58	0.23	0.33
840	4.02	1.02	1.31	0.67	1.00	0.12	0.000	0.10	0.26	0.34
841	4.01	1.03	1.32	0.68	5.00	0.27	0.014	0.20	0.25	0.34
842	4.01	1.03	1.32	0.68	10.00	0.45	0.034	0.33	0.26	0.34
843	4.01	0.99	1.28	0.64	15.00	0.64	0.057	0.45	0.26	0.34
844	4.01	1.01	1.29	0.67	20.00	0.84	0.087	0.61	0.25	0.34
845	3.97	0.96	1.24	0.62	24.99	0.98	0.107	0.66	0.25	0.34
676	3.98	1.07	1.34	0.74	1.00	0.07	-0.002	0.07	0.51	0.59
677	3.99	1.07	1.37	0.71	5.00	0.19	0.013	0.17	0.50	0.59
678	3.98	1.00	1.30	0.63	10.00	0.35	0.031	0.28	0.51	0.59
681	3.98	1.03	1.33	0.67	15.00	0.52	0.048	0.43	0.50	0.59
679	4.01	0.95	1.26	0.58	20.04	0.68	0.065	0.56	0.50	0.59
680	4.00	1.02	1.33	0.66	25.04	0.87	0.093	0.74	0.50	0.59
374	3.99	0.99	1.33	0.59	5.00	0.17	0.015	0.16	0.81	0.90
375	3.97	1.02	1.34	0.63	10.00	0.32	0.035	0.29	0.80	0.90
376	3.96	1.04	1.36	0.67	15.00	0.47	0.053	0.43	0.80	0.90
377	3.97	1.03	1.36	0.64	20.00	0.61	0.070	0.54	0.80	0.90
378	3.98	1.06	1.40	0.66	24.99	0.74	0.089	0.64	0.80	0.90
302	4.01	1.04	1.37	0.64	5.00	0.18	0.018	0.16	1.11	1.20
303	3.99	1.05	1.37	0.67	10.00	0.34	0.041	0.32	1.11	1.20
305	4.00	1.04	1.36	0.66	15.00	0.49	0.060	0.44	1.11	1.20
306	4.07	0.99	1.32	0.60	20.00	0.62	0.080	0.54	1.11	1.20
307	4.06	1.07	1.41	0.67	24.99	0.74	0.103	0.63	1.10	1.20

TABLE 1-5

TRIM = 4 DEGREES
MEAN WETTED LENGTH = 1.0 BEAM

RUN	τ	λ	λ_k	λ_c	C_v^a	C_Δ	C_R	C_M	Z'	D
45	4.00	0.97	1.30	0.58	1.00	0.09	0.006	0.15	1.41	1.50
46	4.00	1.02	1.36	0.63	5.01	0.20	0.018	0.23	1.40	1.50
47	3.98	0.97	1.31	0.57	10.00	0.34	0.031	0.34	1.40	1.50
48	3.94	0.99	1.33	0.58	15.02	0.47	0.048	0.46	1.40	1.50
49	3.97	0.95	1.28	0.57	20.00	0.62	0.066	0.60	1.40	1.50
50	3.95	1.03	1.37	0.64	25.04	0.75	0.088	0.71	1.40	1.50
					MEAN WETTED LENGTH = 2.0 BEAMS					
528	4.06	1.97	2.24	1.64	10.00	0.96	0.104	1.23	0.04	0.19
529	4.02	1.98	2.25	1.66	14.98	1.40	0.149	1.81	0.04	0.19
530	4.01	1.93	2.21	1.59	20.00	1.78	0.196	2.28	0.04	0.19
532	4.01	2.04	2.31	1.70	19.96	1.86	0.205	2.46	0.03	0.19
533	4.00	1.92	2.20	1.58	24.99	2.11	0.229	2.63	0.03	0.19
534	4.02	2.00	2.29	1.64	24.99	2.24	0.247	2.94	0.03	0.19
930	3.99	1.96	2.20	1.67	1.00	0.20	0.012	0.20	0.05	0.21
932	4.00	2.06	2.32	1.73	4.99	0.59	0.048	0.74	0.05	0.21
933	3.98	1.99	2.24	1.68	10.00	1.08	0.101	1.37	0.05	0.21
934	3.97	2.04	2.31	1.71	9.99	1.07	0.105	1.35	0.05	0.21
936	3.96	2.03	2.30	1.70	14.98	1.55	0.164	2.00	0.04	0.21
937	3.94	2.00	2.28	1.67	20.04	2.02	0.215	2.60	0.04	0.21
938	3.92	1.99	2.27	1.64	24.99	2.33	0.257	2.97	0.04	0.21
901	3.99	1.97	2.22	1.66	1.00	0.19	0.011	0.20	0.11	0.26
902	4.01	2.02	2.29	1.69	4.99	0.49	0.039	0.63	0.10	0.26
903	4.01	2.03	2.30	1.70	10.00	0.89	0.088	1.18	0.10	0.26
904	3.99	1.94	2.22	1.60	14.98	1.29	0.137	1.72	0.10	0.26
905	3.97	2.05	2.32	1.72	20.04	1.78	0.192	2.46	0.09	0.26
906	3.94	2.05	2.34	1.70	24.99	2.07	0.233	2.82	0.09	0.26
452	3.96	2.06	2.34	1.71	10.00	0.72	0.078	1.00	0.16	0.33
453	3.94	2.01	2.29	1.67	14.98	1.03	0.115	1.41	0.16	0.33
454	3.95	2.06	2.34	1.71	14.98	1.05	0.119	1.46	0.16	0.33
455	3.96	1.97	2.26	1.63	20.00	1.34	0.153	1.82	0.16	0.33
456	3.96	2.00	2.30	1.63	24.99	1.63	0.193	2.21	0.16	0.33
788	4.01	2.06	2.30	1.76	1.00	0.17	0.012	0.19	0.26	0.41
789	3.99	2.03	2.32	1.68	5.00	0.37	0.031	0.50	0.25	0.41
790	4.00	1.97	2.24	1.63	10.00	0.65	0.067	0.89	0.25	0.41
791	3.97	1.99	2.27	1.64	15.00	0.96	0.110	1.37	0.25	0.41
792	4.02	1.95	2.23	1.60	20.04	1.27	0.155	1.82	0.24	0.41
793	3.96	2.01	2.30	1.66	25.04	1.53	0.195	2.18	0.24	0.41

TABLE 1-6

TRIM = 4 DEGREES
MEAN WETTED LENGTH = 2.0 BEAMS

RUN	τ	λ	λ_k	λ_c	C_V^2	C_Δ	C_R	C_M	Z'	D
640	3.99	2.00	2.27	1.67	1.00	0.16	0.008	0.17	0.51	0.66
641	4.00	2.01	2.31	1.66	5.00	0.34	0.029	0.45	0.50	0.66
642	4.00	2.01	2.30	1.66	10.00	0.56	0.061	0.79	0.50	0.66
643	4.00	1.99	2.29	1.63	15.00	0.80	0.099	1.14	0.50	0.66
644	4.00	2.03	2.33	1.67	20.04	1.05	0.136	1.57	0.49	0.66
645	3.99	1.95	2.24	1.59	24.99	1.23	0.170	1.74	0.50	0.66
379	4.01	2.02	2.34	1.63	5.00	0.29	0.028	0.40	0.74	0.90
380	3.97	2.02	2.34	1.64	10.00	0.49	0.063	0.74	0.73	0.90
381	3.95	2.03	2.36	1.64	15.00	0.69	0.093	1.07	0.73	0.90
382	3.97	2.04	2.36	1.66	20.00	0.88	0.123	1.35	0.73	0.90
383	3.99	2.04	2.36	1.66	24.99	1.06	0.128	1.59	0.73	0.90
309	4.00	2.01	2.33	1.62	5.00	0.31	0.055	0.39	1.04	1.20
310	3.99	2.00	2.32	1.61	10.00	0.50	0.090	0.69	1.04	1.20
311	3.97	2.02	2.34	1.64	14.98	0.71	0.126	1.03	1.03	1.20
312	4.00	2.00	2.33	1.60	20.00	0.90	0.161	1.32	1.03	1.20
313	4.03	2.07	2.43	1.66	24.94	1.06	0.194	1.57	1.03	1.20
39	4.00	2.04	2.33	1.68	1.00	0.15	0.008	0.19	1.34	1.50
40	4.01	2.05	2.37	1.68	5.00	0.30	0.030	0.44	1.33	1.50
41	3.98	2.02	2.34	1.64	10.02	0.49	0.056	0.75	1.33	1.50
42	3.96	2.05	2.37	1.68	15.02	0.68	0.089	1.06	1.33	1.50
43	3.97	2.02	2.34	1.64	20.00	0.87	0.119	1.37	1.33	1.50
44	3.99	2.05	2.38	1.66	24.99	1.05	0.146	1.65	1.33	1.50

MEAN WETTED LENGTH = 3.0 BEAMS

888	3.98	3.06	3.30	2.77	1.00	0.42	0.031	0.57	0.05	0.28
889	3.99	2.98	3.24	2.66	4.99	0.80	0.075	1.34	0.05	0.28
890	4.00	2.99	3.26	2.67	10.00	1.42	0.131	2.45	0.05	0.28
891	3.98	3.01	3.28	2.69	15.00	2.05	0.199	3.61	0.04	0.28
892	3.98	2.91	3.19	2.57	20.00	2.59	0.266	4.44	0.04	0.28
893	3.98	2.99	3.27	2.64	20.00	2.70	0.275	4.73	0.03	0.28
894	3.98	3.04	3.33	2.69	25.04	3.07	0.332	5.44	0.03	0.28
859	4.03	2.92	3.16	2.62	1.00	0.39	0.030	0.55	0.11	0.33
860	3.98	3.02	3.27	2.71	1.00	0.39	0.030	0.55	0.10	0.33
861	4.04	3.00	3.27	2.67	5.00	0.73	0.064	1.22	0.10	0.33
458	3.97	3.00	3.29	2.66	10.00	1.13	0.122	2.02	0.09	0.33
863	4.01	3.04	3.32	2.69	9.99	1.20	0.114	2.16	0.09	0.33
459	3.98	3.01	3.30	2.67	15.00	1.60	0.185	2.91	0.09	0.33
866	4.07	2.95	3.22	2.62	14.98	1.71	0.187	3.09	0.09	0.33
460	3.96	2.95	3.23	2.61	20.00	2.05	0.238	3.75	0.09	0.33
865	4.05	2.95	3.22	2.61	19.96	2.18	0.245	3.97	0.09	0.33
462	4.08	2.99	3.28	2.63	24.99	2.51	0.301	4.51	0.08	0.33
867	4.03	3.00	3.30	2.64	24.99	2.56	0.297	4.70	0.09	0.33

TABLE 1-7

TRIM = 4 DEGREES
MEAN WETTED LENGTH = 3.0 BEAMS

RUN	τ	λ	λ_k	λ_c	C_V^a	C_Δ	C_R	C_M	Z'	D
762	3.98	2.98	3.23	2.67	1.00	0.34	0.031	0.47	0.26	0.48
763	4.00	2.95	3.23	2.61	5.00	0.59	0.059	1.00	0.25	0.48
764	3.99	3.04	3.33	2.69	10.00	0.93	0.101	1.77	0.25	0.48
766	4.01	2.99	3.27	2.66	14.98	1.28	0.153	2.50	0.24	0.48
767	4.03	3.04	3.32	2.70	20.00	1.68	0.212	3.43	0.24	0.48
768	4.00	3.00	3.29	2.64	25.04	1.95	0.250	3.86	0.24	0.48
617	3.99	2.99	3.23	2.69	1.00	0.31	0.020	0.44	0.52	0.73
618	4.00	3.02	3.31	2.67	5.01	0.53	0.048	0.90	0.50	0.73
620	4.00	2.93	3.23	2.57	10.00	0.76	0.079	1.40	0.50	0.73
621	4.00	3.03	3.33	2.67	15.00	1.07	0.128	2.16	0.49	0.73
622	4.01	2.96	3.26	2.61	20.04	1.35	0.175	2.75	0.49	0.73
623	4.01	2.92	3.22	2.56	24.99	1.59	0.216	3.23	0.49	0.73
624	4.01	3.03	3.33	2.67	25.04	1.64	0.220	3.39	0.49	0.73
384	4.01	3.04	3.36	2.67	5.00	0.49	0.058	0.85	0.67	0.90
385	4.00	2.97	3.29	2.59	10.02	0.69	0.089	1.36	0.67	0.90
386	3.98	2.99	3.30	2.61	15.00	0.93	0.130	1.91	0.66	0.90
387	4.01	2.97	3.29	2.59	20.00	1.17	0.175	2.44	0.66	0.90
388	4.01	3.02	3.34	2.64	24.99	1.40	0.216	2.95	0.66	0.90
314	3.99	3.02	3.34	2.64	5.00	0.50	0.050	0.87	0.97	1.20
315	3.99	3.01	3.31	2.64	10.00	0.70	0.088	1.38	0.96	1.20
316	3.97	3.06	3.39	2.68	15.00	0.93	0.134	1.92	0.96	1.20
317	4.03	3.02	3.34	2.64	20.00	1.17	0.180	2.45	0.96	1.20
318	4.08	3.04	3.36	2.66	24.99	1.40	0.224	3.00	0.96	1.20
38	4.00	3.04	3.33	2.69	1.00	0.32	0.029	0.49	1.27	1.50
27	3.98	3.02	3.34	2.64	5.00	0.52	0.056	0.90	1.28	1.50
35	4.00	3.07	3.40	2.68	10.00	0.73	0.088	1.43	1.26	1.50
36	3.99	2.97	3.29	2.60	10.00	0.72	0.091	1.41	1.27	1.50
33	3.99	3.07	3.40	2.68	15.02	0.96	0.128	2.01	1.26	1.50
34	3.99	3.02	3.34	2.64	15.00	0.95	0.124	1.98	1.26	1.50
30	4.06	2.95	3.26	2.58	20.00	1.16	0.173	2.44	1.26	1.50
32	4.08	3.01	3.34	2.61	20.00	1.18	0.172	2.48	1.26	1.50
29	4.07	3.00	3.32	2.61	24.99	1.36	0.205	2.90	1.26	1.50
28	4.06	3.08	3.41	2.69	25.09	1.40	0.209	3.06	1.25	1.50

TABLE 1-8

TRIM = 4 DEGREES
MEAN WETTED LENGTH = 3.5 BEAMS

RUN	τ	λ	λ_k	λ_c	C_V^2	C_Δ	C_R	C_M	Z'	D
869	3.98	3.55	3.80	3.23	1.00	0.53	0.044	0.80	0.05	0.32
870	3.99	3.49	3.78	3.13	4.99	0.93	0.093	1.66	0.05	0.32
871	3.97	3.49	3.78	3.14	9.98	1.49	0.154	2.86	0.05	0.32
872	3.99	3.44	3.73	3.08	14.98	2.15	0.224	4.20	0.04	0.32
873	3.99	3.45	3.74	3.09	20.04	2.79	0.300	5.48	0.04	0.32
874	3.99	3.57	3.88	3.20	24.99	3.27	0.367	6.55	0.04	0.32
825	4.02	3.45	3.70	3.14	1.00	0.50	0.042	0.76	0.11	0.37
826	4.04	3.51	3.79	3.18	5.00	0.90	0.094	1.64	0.09	0.37
827	4.04	3.43	3.71	3.09	10.00	1.35	0.133	2.63	0.09	0.37
828	4.04	3.50	3.78	3.16	15.00	1.90	0.211	3.87	0.09	0.37
829	4.04	3.50	3.79	3.14	20.00	2.47	0.282	5.11	0.08	0.37
830	4.04	3.45	3.76	3.09	24.99	2.82	0.334	5.71	0.09	0.37
728	3.99	3.49	3.73	3.19	1.00	0.45	0.033	0.69	0.26	0.52
731	4.01	3.51	3.80	3.16	5.00	0.72	0.084	1.32	0.25	0.52
732	4.01	3.46	3.76	3.10	9.99	1.01	0.101	2.07	0.25	0.52
733	4.03	3.55	3.86	3.19	14.98	1.43	0.180	3.12	0.24	0.52
734	4.03	3.47	3.78	3.10	20.04	1.82	0.245	4.01	0.24	0.52
735	4.01	3.48	3.80	3.10	24.99	2.15	0.297	4.73	0.24	0.52
591	4.00	3.45	3.70	3.13	1.00	0.40	0.028	0.62	0.52	0.77
592	4.00	3.22	3.52	2.87	5.00	0.59	0.061	1.04	0.50	0.77
593	3.99	3.63	3.93	3.27	5.00	0.70	0.078	1.32	0.48	0.77
594	4.01	3.57	3.88	3.21	10.00	0.91	0.111	1.96	0.49	0.77
595	4.00	3.49	3.79	3.12	15.00	1.18	0.157	2.65	0.49	0.77
596	4.02	3.45	3.76	3.09	20.00	1.46	0.209	3.43	0.49	0.77
597	4.03	3.57	3.89	3.20	25.04	1.81	0.262	4.26	0.48	0.77
389	4.00	3.54	3.87	3.16	5.00	0.60	0.080	1.12	0.63	0.90
390	4.00	3.52	3.83	3.14	10.02	0.81	0.117	1.76	0.63	0.90
391	3.99	3.47	3.79	3.10	15.00	1.08	0.162	2.47	0.63	0.90
392	4.00	3.45	3.77	3.08	19.96	1.38	0.212	3.19	0.63	0.90
393	4.01	3.55	3.89	3.16	24.94	1.59	0.257	3.79	0.62	0.90
319	4.01	3.55	3.88	3.16	5.00	0.63	0.072	1.17	0.93	1.20
320	4.00	3.52	3.86	3.13	10.00	0.83	0.108	1.80	0.93	1.20
322	3.99	3.46	3.78	3.08	15.00	1.07	0.163	2.45	0.93	1.20
323	4.03	3.52	3.86	3.12	20.00	1.34	0.209	3.15	0.92	1.20
324	4.07	3.57	3.90	3.19	24.99	1.56	0.256	3.74	0.92	1.20
51	4.00	3.55	3.84	3.20	1.00	0.36	0.025	0.55	1.23	1.50
52	4.01	3.50	3.82	3.12	4.95	0.61	0.070	1.14	1.23	1.50
154	4.04	3.54	3.87	3.16	5.00	0.61	0.072	1.21	1.22	1.50
53	4.01	3.49	3.80	3.11	10.02	0.79	0.104	1.70	1.23	1.50
155	4.02	3.51	3.83	3.12	15.00	1.05	0.149	2.48	1.22	1.50
54	4.04	3.44	3.78	3.03	20.00	1.28	0.191	2.99	1.23	1.50
56	4.04	3.47	3.79	3.09	20.04	1.28	0.194	3.02	1.22	1.50
57	4.04	3.54	3.88	3.13	25.04	1.50	0.241	3.68	1.22	1.50

TABLE 1-9

TRIM = 6 DEGREES
MEAN WETTED LENGTH = 1.0 BEAM

RUN	τ	λ	λ_k	λ_c	C_v [a]	C_Δ	C_R	C_M	Z'	D
955	5.99	1.05	1.22	0.81	1.00	0.13	0.006	0.11	0.07	0.18
956	5.99	1.00	1.18	0.77	4.99	0.49	0.054	0.36	0.07	0.18
957	5.97	1.01	1.19	0.77	10.00	0.99	0.113	0.73	0.07	0.18
958	5.97	1.00	1.17	0.77	14.98	1.49	0.173	1.11	0.06	0.18
959	5.95	0.98	1.16	0.74	20.04	1.92	0.226	1.37	0.06	0.18
960	5.90	0.95	1.12	0.71	24.99	2.24	0.275	1.54	0.06	0.18
907	5.95	0.99	1.16	0.77	1.00	0.09	0.005	0.07	0.12	0.23
909	5.97	1.02	1.20	0.78	4.99	0.41	0.046	0.30	0.12	0.23
910	5.98	0.99	1.16	0.76	10.03	0.81	0.096	0.60	0.11	0.23
911	5.96	0.97	1.14	0.73	14.98	1.21	0.143	0.89	0.11	0.23
912	5.97	1.00	1.18	0.77	20.00	1.69	0.201	1.30	0.10	0.23
913	5.92	0.99	1.16	0.76	24.99	1.99	0.250	1.47	0.10	0.23
473	5.97	1.00	1.19	0.76	10.00	0.65	0.088	0.49	0.22	0.33
474	5.93	1.01	1.20	0.77	14.98	0.97	0.131	0.74	0.22	0.33
475	5.96	1.00	1.19	0.76	20.00	1.27	0.170	0.93	0.21	0.33
476	5.98	0.99	1.18	0.74	24.99	1.54	0.210	1.12	0.21	0.33
809	5.98	1.04	1.23	0.79	1.00	0.09	0.000	0.09	0.27	0.38
810	6.00	1.01	1.19	0.77	5.00	0.33	0.033	0.28	0.27	0.38
811	6.00	0.98	1.11	0.68	10.04	0.61	0.066	0.48	0.27	0.38
812	5.98	0.97	1.14	0.74	10.04	0.63	0.070	0.50	0.26	0.38
813	5.96	0.99	1.17	0.74	14.98	0.94	0.106	0.75	0.26	0.38
814	5.97	1.00	1.19	0.74	20.00	1.27	0.156	1.01	0.26	0.38
815	5.96	0.97	1.16	0.73	24.99	1.51	0.190	1.14	0.26	0.38
654	5.98	0.94	1.14	0.67	1.00	0.06	0.001	0.03	0.53	0.63
656	5.99	1.05	1.24	0.80	5.00	0.28	0.033	0.21	0.51	0.63
657	5.98	1.01	1.20	0.77	10.00	0.52	0.063	0.38	0.52	0.63
658	5.96	0.95	1.13	0.70	14.98	0.77	0.093	0.57	0.52	0.63
659	5.97	1.01	1.20	0.76	20.04	1.05	0.137	0.81	0.51	0.63
660	5.93	1.00	1.21	0.73	24.99	1.26	0.173	0.93	0.51	0.63
395	6.00	0.94	1.14	0.68	5.00	0.25	0.027	0.21	0.79	0.90
396	5.98	0.94	1.13	0.68	10.00	0.47	0.061	0.39	0.78	0.90
397	5.95	1.00	1.20	0.73	15.00	0.70	0.089	0.58	0.78	0.90
398	5.97	0.97	1.18	0.71	20.00	0.93	0.119	0.75	0.78	0.90
399	5.98	1.02	1.23	0.76	24.99	1.13	0.150	0.92	0.77	0.90
326	6.00	1.00	1.22	0.72	5.00	0.29	0.027	0.28	1.09	1.20
327	5.96	1.02	1.22	0.76	10.00	0.51	0.060	0.46	1.08	1.20
328	5.95	1.03	1.23	0.77	15.00	0.73	0.091	0.63	1.08	1.20
329	6.05	1.00	1.21	0.73	20.00	0.95	0.125	0.80	1.08	1.20
330	6.06	1.01	1.21	0.76	24.99	1.13	0.152	0.92	1.08	1.20

TABLE 1-10

TRIM = 6 DEGREES
MEAN WETTED LENGTH = 1.0 BEAMS

RUN	τ	λ	λ_k	λ_c	C_V [a]	C_Δ	C_R	C_M	Z'	D
71	6.01	0.98	1.22	0.68	1.00	0.11	0.005	0.15	1.37	1.50
73	5.99	1.04	1.24	0.78	5.00	0.25	0.029	0.23	1.37	1.50
163	6.00	1.06	1.28	0.78	5.00	0.27	0.032	0.29	1.37	1.50
74	5.96	1.03	1.23	0.77	10.00	0.49	0.057	0.43	1.37	1.50
75	5.93	1.01	1.22	0.74	15.02	0.74	0.087	0.67	1.37	1.50
76	5.95	1.00	1.21	0.73	20.00	0.95	0.117	0.84	1.37	1.50
77	5.97	1.08	1.32	0.78	24.99	1.17	0.145	1.04	1.37	1.50
78	5.96	1.03	1.24	0.76	25.04	1.15	0.145	1.01	1.37	1.50
					MEAN WETTED LENGTH = 2.0 BEAMS					
881	5.98	1.98	2.13	1.77	1.00	0.27	0.027	0.27	0.08	0.28
882	5.96	1.95	2.12	1.71	4.99	0.79	0.090	0.96	0.07	0.28
883	5.95	2.01	2.19	1.77	10.00	1.55	0.188	1.95	0.06	0.28
884	5.94	1.91	2.09	1.68	14.98	2.19	0.272	2.72	0.06	0.23
885	5.94	1.96	2.13	1.73	14.98	2.26	0.281	2.82	0.05	0.28
886	5.96	1.99	2.17	1.76	20.04	2.91	0.367	3.69	0.05	0.28
887	5.90	1.96	2.14	1.71	24.99	3.29	0.426	4.12	0.05	0.28
852	6.02	2.05	2.21	1.82	1.00	0.30	0.030	0.33	0.12	0.33
853	6.02	2.00	2.18	1.77	4.99	0.72	0.086	0.93	0.12	0.33
477	5.94	2.06	2.23	1.82	10.00	1.29	0.164	1.70	0.11	0.33
854	5.99	2.04	2.22	1.80	9.99	1.36	0.176	1.78	0.11	0.33
478	5.91	1.96	2.13	1.73	14.98	1.80	0.234	2.30	0.11	0.33
856	6.00	2.02	2.20	1.79	14.98	2.00	0.267	2.66	0.11	0.33
479	5.92	1.95	2.13	1.70	20.00	2.37	0.311	3.03	0.11	0.33
857	5.99	1.94	2.11	1.70	20.00	2.49	0.339	3.18	0.11	0.33
480	5.92	2.04	2.23	1.79	24.99	2.79	0.374	3.61	0.10	0.33
858	5.97	2.01	2.20	1.77	24.99	2.96	0.412	3.81	0.10	0.33
754	6.03	1.94	2.11	1.70	1.00	0.26	0.024	0.29	0.28	0.48
755	5.98	2.07	2.26	1.82	5.00	0.60	0.065	0.80	0.26	0.48
756	5.98	1.95	2.13	1.70	10.02	1.01	0.127	1.34	0.27	0.48
757	5.96	1.98	2.17	1.73	15.00	1.50	0.201	2.09	0.26	0.48
758	5.97	2.10	2.29	1.86	20.04	2.00	0.278	2.84	0.25	0.48
759	5.96	1.93	2.11	1.69	20.04	1.92	0.269	2.62	0.26	0.48
760	5.98	1.92	2.11	1.67	25.04	2.26	0.322	3.03	0.26	0.48
761	5.97	2.02	2.21	1.77	24.99	2.33	0.335	3.22	0.25	0.48
608	5.98	2.01	2.19	1.77	1.00	0.19	0.016	0.19	0.54	0.73
610	5.99	2.00	2.19	1.76	5.00	0.48	0.059	0.63	0.52	0.73
611	5.98	2.02	2.21	1.78	10.00	0.86	0.114	1.20	0.51	0.73
612	6.03	2.03	2.22	1.78	15.00	1.24	0.174	1.79	0.51	0.73
613	5.98	1.95	2.14	1.70	20.00	1.60	0.229	2.28	0.51	0.73
614	5.97	2.02	2.21	1.77	25.04	1.93	0.285	2.76	0.51	0.73

TABLE 1-11

TRIM = 6 DEGREES
MEAN WETTED LENGTH = 2.0 BEAMS

RUN	τ	λ	λ_k	λ_c	C_v^2	C_Δ	C_R	C_M	Z'	D
400	5.99	1.92	2.12	1.66	5.00	0.42	0.053	0.56	0.69	0.90
401	6.00	1.98	2.19	1.71	5.00	0.44	0.052	0.60	0.68	0.90
402	5.93	1.95	2.16	1.68	10.00	0.76	0.107	1.08	0.68	0.90
403	5.95	2.00	2.20	1.73	15.02	1.10	0.157	1.59	0.67	0.90
404	5.98	1.98	2.20	1.70	20.00	1.41	0.206	2.02	0.67	0.90
405	6.00	2.01	2.22	1.74	24.99	1.71	0.256	2.50	0.67	0.90
332	5.99	2.00	2.20	1.73	5.00	0.45	0.053	0.61	0.99	1.20
333	5.97	2.01	2.21	1.76	10.00	0.75	0.103	1.08	0.99	1.20
334	5.95	1.98	2.19	1.71	15.00	1.06	0.155	1.54	0.98	1.20
335	5.99	1.92	2.11	1.67	20.00	1.36	0.201	1.98	0.98	1.20
336	6.00	1.96	2.18	1.68	20.00	1.38	0.202	2.00	0.98	1.20
337	6.04	2.02	2.23	1.74	24.99	1.67	0.251	2.48	0.98	1.20
65	6.00	1.99	2.21	1.70	1.00	0.21	0.018	0.24	1.27	1.50
160	6.01	1.99	2.20	1.72	5.00	0.45	0.051	0.65	1.28	1.50
69	5.97	2.00	2.20	1.73	20.00	1.35	0.195	1.99	1.27	1.50
64	6.00	2.05	2.27	1.78	1.00	0.21	0.019	0.24	1.27	1.50
66	6.00	2.05	2.24	1.79	4.94	0.45	0.049	0.62	1.27	1.50
67	5.98	2.05	2.24	1.79	10.02	0.75	0.098	1.11	1.27	1.50
68	5.94	2.04	2.23	1.78	15.02	1.06	0.148	1.58	1.27	1.50
70	6.00	2.04	2.24	1.78	24.99	1.64	0.243	2.47	1.27	1.50

MEAN WETTED LENGTH = 3.0 BEAMS

800	5.98	3.03	3.19	2.81	1.00	0.57	0.059	0.77	0.07	0.39
802	6.01	2.99	3.16	2.76	5.00	1.15	0.133	1.88	0.06	0.39
803	5.97	3.01	3.19	2.77	10.00	2.01	0.243	3.40	0.06	0.39
805	5.96	3.01	3.21	2.76	15.00	2.88	0.366	4.98	0.05	0.39
807	6.02	3.00	3.20	2.74	20.00	3.72	0.484	6.40	0.04	0.39
808	6.02	2.99	3.19	2.72	25.04	4.13	0.550	7.16	0.05	0.39
775	5.99	3.06	3.22	2.83	1.00	0.55	0.057	0.75	0.12	0.44
776	6.00	3.03	3.21	2.79	5.00	1.06	0.123	1.80	0.11	0.44
777	5.97	3.01	3.19	2.77	10.00	1.77	0.218	3.10	0.11	0.44
778	5.99	2.93	3.11	2.69	15.00	2.52	0.328	4.47	0.10	0.44
779	6.10	2.99	3.17	2.74	20.04	3.25	0.435	5.86	0.10	0.44
780	5.97	3.00	3.20	2.74	24.99	3.67	0.504	6.62	0.10	0.44
690	5.98	2.99	3.14	2.78	1.00	0.48	0.053	0.63	0.27	0.59
691	6.00	3.04	3.22	2.79	5.00	0.87	0.100	1.52	0.25	0.59
692	5.99	3.01	3.20	2.77	10.00	1.38	0.168	2.57	0.25	0.59
693	6.00	3.01	3.21	2.76	15.00	1.97	0.265	3.78	0.25	0.59
694	6.01	2.97	3.18	2.71	20.00	2.56	0.352	4.94	0.25	0.59
695	5.99	3.02	3.22	2.77	24.99	3.02	0.436	5.89	0.25	0.59

TABLE 1-12

TRIM = 6 DEGREES
MEAN WETTED LENGTH = 3.0 BEAMS

RUN	τ	λ	λ_k	λ_c	C_V [a]	C_Δ	C_R	C_M	Z'	D
574	5.99	2.92	3.08	2.70	1.00	0.40	0.042	0.52	0.55	0.84
575	5.98	3.03	3.20	2.80	1.00	0.43	0.047	0.57	0.54	0.84
576	5.97	2.96	3.16	2.71	5.00	0.75	0.089	1.26	0.51	0.84
577	6.00	3.04	3.23	2.79	10.00	1.23	0.150	2.40	0.50	0.84
579	6.00	2.98	3.18	2.72	15.00	1.70	0.224	3.41	0.50	0.84
580	6.00	3.04	3.23	2.79	20.00	2.20	0.308	4.52	0.50	0.84
581	6.11	2.91	3.11	2.66	24.99	2.50	0.355	4.95	0.51	0.84
582	6.03	2.99	3.19	2.73	24.99	2.56	0.368	5.20	0.50	0.84
406	6.01	2.94	3.13	2.68	5.00	0.72	0.093	1.24	0.58	0.90
408	5.97	3.02	3.22	2.76	10.00	1.14	0.154	2.22	0.57	0.90
409	5.95	3.03	3.23	2.77	15.00	1.55	0.237	3.13	0.57	0.90
410	5.98	2.94	3.14	2.68	20.00	1.96	0.308	3.94	0.57	0.90
411	6.00	3.00	3.20	2.73	24.99	2.33	0.375	4.79	0.56	0.90
338	5.99	3.04	3.23	2.78	5.00	0.75	0.087	1.31	0.88	1.20
339	5.98	3.01	3.21	2.76	10.00	1.09	0.139	2.12	0.88	1.20
340	5.98	3.03	3.23	2.77	15.00	1.48	0.220	3.00	0.88	1.20
341	6.01	2.96	3.17	2.69	19.96	1.86	0.284	3.79	0.87	1.20
342	6.04	3.04	3.26	2.77	24.99	2.18	0.343	4.54	0.87	1.20
22	6.01	3.06	3.28	2.78	1.00	0.50	0.084	0.73	1.17	1.50
23	6.01	2.95	3.17	2.68	1.00	0.48	0.084	0.71	1.18	1.50
4	5.98	3.00	3.20	2.73	5.00	0.69	0.084	1.23	1.18	1.50
161	6.03	2.95	3.14	2.69	5.00	0.69	0.089	1.21	1.18	1.50
20	6.00	3.05	3.26	2.78	10.00	1.15	0.170	2.29	1.17	1.50
21	5.99	2.95	3.16	2.69	10.02	1.13	0.165	2.18	1.18	1.50
19	5.99	3.00	3.21	2.73	15.00	1.52	0.234	3.11	1.17	1.50
9	6.00	2.94	3.13	2.68	20.04	1.79	0.265	3.71	1.17	1.50
10	6.00	2.95	3.16	2.69	20.04	1.82	0.266	3.77	1.17	1.50
16	6.04	2.99	3.19	2.72	20.00	1.83	0.282	3.80	1.17	1.50
7	5.98	2.90	3.11	2.63	24.99	2.08	0.322	4.26	1.18	1.50
162	6.06	3.11	3.32	2.83	24.99	2.20	0.350	4.80	1.15	1.50

MEAN WETTED LENGTH = 3.5 BEAMS

769	5.99	3.51	3.67	3.29	1.00	0.73	0.080	1.10	0.08	0.44
770	5.98	3.47	3.67	3.22	5.00	1.31	0.159	2.38	0.07	0.44
771	5.98	3.46	3.64	3.21	10.00	2.18	0.267	4.10	0.06	0.44
772	5.98	3.52	3.71	3.28	15.00	3.28	0.420	6.32	0.05	0.44
773	5.98	3.50	3.70	3.24	20.04	4.05	0.538	7.86	0.05	0.44
774	5.95	3.44	3.64	3.18	24.99	4.52	0.617	8.75	0.04	0.44

TABLE I-13

TRIM = 6 DEGREES
MEAN WETTED LENGTH = 3.5 BEAMS

RUN	τ	λ	λ_k	λ_c	C_V^2	C_Δ	C_R	C_M	Z'	D
744	6.00	3.52	3.67	3.31	1.00	0.72	0.080	1.09	0.13	0.49
746	6.00	3.54	3.72	3.29	5.00	1.28	0.160	2.34	0.11	0.49
747	5.99	3.51	3.70	3.26	10.00	1.97	0.254	3.89	0.11	0.49
749	5.98	3.46	3.66	3.21	14.98	2.82	0.388	5.62	0.10	0.49
750	5.99	3.46	3.66	3.20	20.00	3.62	0.502	7.25	0.10	0.49
753	5.99	3.50	3.71	3.23	24.99	4.00	0.576	8.02	0.10	0.49
648	5.98	3.53	3.69	3.31	1.00	0.63	0.077	0.93	0.28	0.64
649	6.00	3.56	3.74	3.31	5.00	1.07	0.137	2.00	0.25	0.64
650	6.01	3.54	3.73	3.29	10.00	1.59	0.208	3.29	0.25	0.64
651	6.02	3.44	3.63	3.19	15.00	2.18	0.309	4.59	0.25	0.64
652	6.02	3.51	3.71	3.26	20.04	2.84	0.412	6.14	0.24	0.64
653	5.99	3.44	3.64	3.17	24.99	3.22	0.479	6.87	0.25	0.64
565	5.99	3.51	3.68	3.28	1.00	0.55	0.065	0.84	0.47	0.89
567	5.99	3.50	3.70	3.24	5.00	0.97	0.125	1.80	0.44	0.89
568	6.00	3.48	3.68	3.22	10.00	1.39	0.192	2.93	0.44	0.89
569	6.01	3.47	3.67	3.21	14.98	1.93	0.284	4.27	0.43	0.89
570	6.01	3.50	3.70	3.23	20.00	2.46	0.372	5.57	0.42	0.89
571	6.04	3.59	3.80	3.32	25.04	2.95	0.496	6.83	0.41	0.89
572	6.04	3.54	3.74	3.27	24.99	2.90	0.497	6.62	0.43	0.89
412	6.02	3.55	3.74	3.29	5.00	0.97	0.125	1.85	0.52	0.90
413	5.98	3.53	3.74	3.27	10.02	1.36	0.178	2.94	0.52	0.90
414	6.01	3.47	3.68	3.21	15.00	1.85	0.270	4.13	0.51	0.90
415	6.03	3.55	3.76	3.28	20.00	2.31	0.362	5.30	0.51	0.90
416	6.03	3.58	3.79	3.31	24.99	2.70	0.435	6.35	0.51	0.90
417	5.98	3.53	3.74	3.27	24.94	2.62	0.423	6.09	0.51	0.90
344	6.02	3.53	3.74	3.26	5.00	0.94	0.113	1.79	0.83	1.20
345	6.00	3.51	3.72	3.23	10.00	1.29	0.183	2.80	0.83	1.20
347	5.99	3.47	3.68	3.21	15.00	1.71	0.259	3.88	0.82	1.20
348	6.01	3.49	3.69	3.22	20.00	2.13	0.337	4.89	0.82	1.20
349	6.03	3.49	3.69	3.22	24.99	2.48	0.406	5.82	0.82	1.20
59	6.00	3.48	3.69	3.21	1.00	0.51	0.052	0.76	1.13	1.50
60	6.03	3.50	3.70	3.23	4.94	0.90	0.109	1.70	1.13	1.50
156	5.99	3.44	3.64	3.17	5.00	0.86	0.114	1.62	1.13	1.50
61	6.00	3.46	3.67	3.20	10.02	1.24	0.156	2.69	1.13	1.50
62	6.01	3.46	3.67	3.20	15.02	1.68	0.242	3.84	1.12	1.50
157	6.03	3.42	3.63	3.14	20.00	2.04	0.319	4.67	1.12	1.50
159	6.04	3.49	3.69	3.22	20.00	2.09	0.327	4.89	1.11	1.50
63	6.06	3.47	3.68	3.21	24.99	2.43	0.381	5.77	1.12	1.50

TABLE 1-14

TRIM = 8 DEGREES
MEAN WETTED LENGTH = 1.0 BEAM

RUN	τ	λ	λ_k	λ_c	C_V^2	C_Δ	C_R	C_M	Z'	D
537	7.71	0.98	1.12	0.79	10.00	1.14	0.173	0.83	0.06	0.19
538	7.74	0.98	1.12	0.79	14.98	1.67	0.255	1.18	0.06	0.19
539	7.76	0.96	1.09	0.77	20.00	2.14	0.323	1.47	0.06	0.19
540	7.77	0.96	1.09	0.77	24.99	2.47	0.377	1.65	0.06	0.19
922	7.99	0.98	1.11	0.79	1.00	0.13	0.014	0.09	0.08	0.21
923	8.03	1.02	1.14	0.84	4.99	0.66	0.098	0.50	0.07	0.21
924	7.99	1.01	1.13	0.82	9.99	1.24	0.189	0.90	0.07	0.21
925	7.91	0.99	1.12	0.80	14.98	1.83	0.277	1.32	0.07	0.21
926	7.83	0.97	1.10	0.78	20.04	2.38	0.361	1.67	0.06	0.21
927	7.77	0.98	1.11	0.79	24.99	2.85	0.439	2.01	0.06	0.21
895	7.99	1.06	1.18	0.88	1.00	0.12	0.013	0.08	0.13	0.26
896	7.97	1.01	1.14	0.82	5.00	0.54	0.078	0.40	0.13	0.26
897	7.95	1.00	1.12	0.81	10.00	1.05	0.158	0.76	0.13	0.26
898	7.90	0.98	1.11	0.79	15.00	1.56	0.236	1.11	0.12	0.26
899	7.85	0.99	1.13	0.79	20.04	2.14	0.326	1.58	0.11	0.26
900	7.79	0.97	1.11	0.77	25.04	2.46	0.386	1.71	0.11	0.26
483	7.94	0.95	1.08	0.77	9.99	0.90	0.139	0.67	0.20	0.33
484	7.87	0.92	1.03	0.74	14.98	1.32	0.208	0.95	0.20	0.33
485	7.87	1.05	1.19	0.85	15.00	1.45	0.225	1.13	0.19	0.33
486	7.86	0.97	1.10	0.78	20.00	1.75	0.270	1.29	0.18	0.33
487	7.95	0.99	1.12	0.79	24.99	2.19	0.345	1.59	0.18	0.33
781	7.99	1.04	1.18	0.84	1.00	0.11	0.008	0.11	0.27	0.41
782	7.99	1.01	1.16	0.81	5.00	0.45	0.059	0.38	0.27	0.41
783	7.98	1.02	1.16	0.83	10.00	0.88	0.125	0.72	0.27	0.41
784	7.91	1.00	1.13	0.80	15.02	1.29	0.187	1.02	0.27	0.41
785	7.65	1.00	1.13	0.80	20.04	1.70	0.256	1.34	0.26	0.41
786	7.86	1.03	1.17	0.83	25.04	2.06	0.323	1.60	0.26	0.41
632	7.98	1.05	1.20	0.84	1.00	0.10	0.007	0.08	0.52	0.66
634	8.00	1.03	1.18	0.82	5.00	0.33	0.059	0.35	0.52	0.66
635	8.00	0.95	1.09	0.74	10.00	0.67	0.111	0.60	0.52	0.66
636	7.90	1.01	1.16	0.81	14.98	1.06	0.174	0.92	0.51	0.66
637	7.94	0.98	1.12	0.78	20.00	1.40	0.231	1.16	0.51	0.66
639	7.88	0.99	1.12	0.79	25.04	1.67	0.287	1.29	0.51	0.66
418	7.87	1.02	1.17	0.82	5.00	0.36	0.052	0.32	0.77	0.90
419	7.84	1.00	1.14	0.80	10.00	0.68	0.100	0.57	0.76	0.90
420	7.93	1.00	1.14	0.80	14.98	1.04	0.151	0.89	0.76	0.90
421	7.88	1.02	1.17	0.82	20.00	1.31	0.201	1.05	0.76	0.90
422	7.83	1.04	1.19	0.82	24.99	1.60	0.251	1.28	0.76	0.90

TABLE 1-15

TRIM = 8 DEGREES
MEAN WETTED LENGTH = 1.0 BEAM

RUN	τ	λ	λ_k	λ_c	C_V^2	C_Δ	C_R	C_M	Z'	D
351	7.82	1.01	1.16	0.80	5.00	0.36	0.048	0.33	1.06	1.20
352	7.79	1.04	1.20	0.82	10.00	0.69	0.102	0.62	1.05	1.20
353	7.87	1.02	1.17	0.81	15.00	1.01	0.149	0.86	1.05	1.20
354	7.93	1.02	1.18	0.80	20.00	1.29	0.198	1.05	1.05	1.20
355	7.86	1.02	1.18	0.81	24.99	1.56	0.246	1.27	1.05	1.20
79	7.98	1.09	1.23	0.88	1.00	0.14	0.008	0.17	1.34	1.50
80	7.97	1.01	1.18	0.78	1.00	0.13	0.006	0.17	1.35	1.50
81	7.95	1.04	1.24	0.78	5.00	0.38	0.046	0.38	1.35	1.50
83	7.92	1.08	1.23	0.88	10.00	0.70	0.096	0.64	1.35	1.50
84	7.86	1.07	1.22	0.86	15.02	1.01	0.145	0.89	1.35	1.50
85	7.89	1.01	1.16	0.80	15.02	1.01	0.150	0.88	1.35	1.50
86	7.90	0.98	1.13	0.77	20.00	1.28	0.205	1.04	1.35	1.50
87	7.84	0.99	1.14	0.78	25.04	1.55	0.258	1.24	1.35	1.50
164	7.97	0.97	1.12	0.76	25.04	1.54	0.229	1.25	1.35	1.50

MEAN WETTED LENGTH = 2.0 BEAMS

488	7.80	2.03	2.14	1.86	10.00	2.09	0.326	2.56	0.04	0.33
489	7.93	2.01	2.13	1.82	15.00	3.04	0.479	3.67	0.04	0.33
490	7.83	1.95	2.08	1.77	20.00	3.68	0.584	4.39	0.04	0.33
491	7.80	2.06	2.21	1.86	24.99	4.31	0.689	5.29	0.03	0.33
831	8.02	2.06	2.17	1.89	1.00	0.38	0.050	0.40	0.08	0.35
832	8.02	1.99	2.12	1.80	5.00	1.06	0.156	1.31	0.08	0.35
835	7.96	1.97	2.10	1.78	9.99	1.96	0.311	2.45	0.07	0.35
836	7.83	1.96	2.09	1.77	15.00	2.82	0.445	3.50	0.07	0.35
837	7.80	2.05	2.19	1.84	20.00	3.75	0.600	4.78	0.05	0.35
838	7.78	1.98	2.12	1.78	24.99	4.15	0.670	5.21	0.06	0.35
794	8.04	1.99	2.11	1.81	1.00	0.33	0.042	0.34	0.14	0.40
795	8.04	1.97	2.10	1.78	5.00	0.94	0.140	1.17	0.13	0.40
796	8.01	2.00	2.13	1.81	10.00	1.73	0.267	2.19	0.12	0.40
797	7.89	2.01	2.14	1.81	15.00	2.56	0.403	3.31	0.11	0.40
798	7.78	1.95	2.09	1.76	20.00	3.20	0.520	4.08	0.11	0.40
799	7.85	1.97	2.11	1.78	25.04	3.72	0.613	4.76	0.11	0.40
712	7.99	1.96	2.09	1.78	1.00	0.28	0.033	0.29	0.30	0.55
713	7.99	2.02	2.16	1.83	5.00	0.77	0.110	1.02	0.27	0.55
714	7.98	1.99	2.13	1.79	10.00	1.38	0.211	1.87	0.28	0.55
715	7.94	1.99	2.12	1.79	15.00	2.03	0.317	2.78	0.27	0.55
716	7.90	2.01	2.14	1.82	20.00	2.66	0.429	3.69	0.26	0.55
717	7.87	2.01	2.14	1.81	25.04	3.07	0.503	4.19	0.26	0.55

TABLE 1-16

TRIM = 8 DEGREES
MEAN WETTED LENGTH = 2.0 BEAMS

RUN	τ	λ	λ_k	λ_c	C_v^2	C_Δ	C_R	C_M	Z'	D
583	7.99	2.14	2.26	1.96	1.00	0.30	0.038	0.32	0.53	0.80
584	7.99	1.98	2.11	1.79	1.00	0.27	0.033	0.29	0.55	0.80
585	8.01	1.95	2.09	1.74	5.00	0.65	0.093	0.87	0.53	0.80
587	8.00	2.05	2.19	1.84	10.00	1.19	0.191	1.67	0.52	0.80
588	7.92	1.96	2.10	1.77	15.00	1.69	0.278	2.35	0.52	0.80
589	7.96	1.99	2.13	1.79	20.04	2.25	0.375	3.19	0.51	0.80
590	7.96	2.00	2.14	1.79	24.99	2.64	0.451	3.68	0.51	0.80
423	7.91	2.06	2.20	1.86	5.00	0.63	0.099	0.88	0.63	0.90
424	7.85	2.02	2.17	1.82	10.00	1.13	0.185	1.64	0.63	0.90
425	7.94	2.00	2.14	1.79	14.98	1.61	0.266	2.30	0.63	0.90
426	7.91	2.00	2.14	1.79	20.00	2.08	0.352	3.00	0.62	0.90
427	7.87	2.05	2.20	1.84	24.99	2.47	0.427	3.62	0.62	0.90
356	7.85	2.07	2.21	1.88	5.00	0.65	0.095	0.93	0.92	1.20
357	7.79	2.00	2.16	1.79	10.00	1.09	0.174	1.61	0.92	1.20
358	7.91	2.00	2.13	1.80	15.00	1.54	0.256	2.24	0.92	1.20
359	7.86	2.02	2.17	1.81	20.00	1.97	0.336	2.87	0.91	1.20
360	7.82	2.03	2.18	1.82	24.99	2.39	0.418	3.55	0.91	1.20
88	7.98	2.07	2.23	1.86	1.00	0.29	0.063	0.30	1.21	1.50
89	7.99	1.98	2.13	1.77	1.00	0.30	0.067	0.30	1.22	1.50
90	7.96	2.06	2.20	1.86	5.00	0.66	0.131	0.88	1.22	1.50
91	7.97	2.00	2.14	1.79	5.00	0.64	0.134	0.82	1.22	1.50
92	7.95	1.99	2.13	1.78	10.02	1.10	0.212	1.52	1.22	1.50
93	7.92	1.94	2.09	1.73	15.02	1.51	0.293	2.10	1.23	1.50
94	7.89	1.94	2.09	1.73	15.02	1.55	0.297	2.16	1.22	1.50
95	7.91	1.91	2.04	1.71	20.04	1.95	0.372	2.73	1.22	1.50
96	7.90	1.93	2.08	1.72	20.00	1.94	0.375	2.70	1.23	1.50
97	7.93	1.97	2.12	1.76	25.04	2.29	0.385	3.35	1.22	1.50
165	7.97	1.93	2.08	1.72	24.99	2.25	0.382	3.25	1.22	1.50
166	8.01	1.97	2.11	1.77	24.99	2.27	0.390	3.32	1.22	1.50

MEAN WETTED LENGTH = 3.0 BEAMS

736	8.00	2.92	3.02	2.76	1.00	0.64	0.096	0.82	0.11	0.49
737	8.03	3.01	3.12	2.84	1.00	0.70	0.107	0.91	0.10	0.49
738	7.99	2.99	3.12	2.79	5.00	1.43	0.224	2.30	0.08	0.49
740	7.97	3.04	3.16	2.86	10.00	2.66	0.424	4.49	0.06	0.49
741	7.82	3.05	3.19	2.86	14.98	3.83	0.619	6.54	0.05	0.49
742	7.83	3.00	3.14	2.80	20.00	4.60	0.738	7.87	0.05	0.49
743	7.83	3.06	3.21	2.86	25.04	5.22	0.848	9.13	0.05	0.49

TABLE 1-17

TRIM = 8 DEGREES
MEAN WETTED LENGTH = 3.0 BEAMS

RUN	τ	λ	λ_k	λ_c	C_V^2	C_Δ	C_R	C_M	Z'	D
718	8.01	2.94	3.04	2.77	1.00	0.63	0.090	0.83	0.16	0.54
719	8.02	3.09	3.22	2.90	5.00	1.38	0.210	2.34	0.12	0.54
720	8.02	2.97	3.11	2.78	5.00	1.28	0.198	2.12	0.13	0.54
721	8.00	3.00	3.14	2.80	10.00	2.27	0.360	3.92	0.12	0.54
722	7.99	3.01	3.14	2.81	14.98	3.31	0.537	5.87	0.11	0.54
723	7.96	2.94	3.08	2.73	20.00	4.05	0.678	7.06	0.11	0.54
725	7.86	3.12	3.27	2.91	24.99	4.75	0.809	8.63	0.10	0.54
726	7.84	2.92	3.07	2.71	25.04	4.54	0.779	8.02	0.12	0.54
727	7.86	3.07	3.21	2.87	25.04	4.70	0.800	8.57	0.11	0.54
1006	7.96	2.99	3.13	2.79	14.98	3.24	0.529	5.79	0.13	0.56
1016	7.92	2.99	3.12	2.79	14.98	3.25	0.518	5.82	0.13	0.56
1017	7.93	3.00	3.14	2.80	14.98	3.22	0.519	5.77	0.13	0.56
1018	7.91	3.02	3.16	2.83	15.00	3.27	0.521	5.93	0.13	0.56
1019	7.93	3.01	3.16	2.81	14.98	3.26	0.519	5.89	0.13	0.56
1002	7.87	3.01	3.16	2.81	20.00	4.02	0.661	7.26	0.13	0.56
1010	7.85	2.97	3.11	2.77	20.00	3.94	0.648	7.03	0.13	0.56
1007	7.88	3.04	3.20	2.82	24.99	4.56	0.762	8.39	0.13	0.56
1011	7.84	3.01	3.16	2.80	24.99	4.51	0.752	8.29	0.13	0.56
1012	7.89	3.00	3.14	2.79	24.99	4.49	0.750	8.25	0.13	0.56
1013	7.84	3.04	3.19	2.83	25.04	4.50	0.757	8.33	0.13	0.56
1014	7.83	3.04	3.19	2.83	25.04	4.50	0.755	8.32	0.13	0.56
1015	7.83	3.03	3.18	2.82	24.99	4.51	0.757	8.36	0.13	0.56
1020	7.89	3.00	3.14	2.80	24.99	4.53	0.753	8.35	0.13	0.56
1021	7.97	2.94	3.08	2.73	24.99	4.55	0.765	8.26	0.13	0.56
1022	7.98	2.98	3.12	2.78	25.04	4.63	0.779	8.51	0.13	0.56
1023	7.99	3.03	3.18	2.82	25.04	4.69	0.787	8.73	0.13	0.56
1003	7.81	3.04	3.20	2.82	29.95	5.28	0.886	9.98	0.13	0.56
1008	7.78	3.09	3.23	2.89	34.94	6.20	1.035	11.98	0.13	0.56
1024	7.95	3.13	3.27	2.93	39.97	7.56	1.292	14.49	0.13	0.56
1009	7.67	3.11	3.26	2.91	44.96	8.05	1.342	15.50	0.13	0.56
1005	7.68	3.12	3.27	2.92	49.96	9.11	1.524	17.97	0.13	0.56
625	7.98	3.03	3.13	2.87	1.00	0.61	0.087	0.84	0.31	0.69
627	8.02	3.05	3.19	2.86	5.00	1.16	0.174	2.04	0.27	0.69
628	8.01	2.97	3.11	2.78	10.02	1.89	0.289	3.47	0.27	0.69
629	7.96	2.95	3.09	2.76	14.98	2.74	0.442	5.15	0.26	0.69
630	7.89	3.05	3.20	2.84	20.00	3.53	0.581	6.74	0.25	0.69
631	7.85	3.00	3.14	2.80	24.99	4.00	0.671	7.64	0.25	0.69
428	7.88	3.06	3.20	2.85	5.00	1.03	0.168	1.84	0.49	0.90
429	7.83	3.07	3.21	2.87	10.00	1.70	0.278	3.32	0.48	0.90
430	7.95	2.97	3.11	2.78	15.00	2.33	0.404	4.58	0.49	0.90
431	7.96	2.95	3.10	2.74	20.00	2.90	0.512	5.69	0.48	0.90
432	7.97	3.00	3.14	2.80	24.99	3.46	0.617	6.94	0.48	0.90

TABLE 1-18

TRIM = 8 DEGREES
MEAN WETTED LENGTH = 3.0 BEAMS

RUN	τ	λ	λ_k	λ_c	C_v [a]	C_Δ	C_R	C_M	Z'	D
560	7.98	2.97	3.10	2.78	1.00	0.46	0.085	0.53	0.57	0.94
558	8.01	3.00	3.14	2.80	5.02	1.00	0.157	1.72	0.52	0.94
557	8.01	3.06	3.20	2.87	10.02	1.68	0.266	3.23	0.51	0.94
561	7.97	2.94	3.08	2.73	15.00	2.29	0.392	4.40	0.52	0.94
562	7.89	3.04	3.19	2.83	20.04	3.01	0.527	5.97	0.50	0.94
563	7.97	3.00	3.14	2.80	24.99	3.47	0.618	6.90	0.50	0.94
362	7.85	3.04	3.19	2.83	5.00	1.03	0.154	1.82	0.78	1.20
363	7.89	2.97	3.11	2.77	10.00	1.57	0.262	3.06	0.78	1.20
364	7.97	2.94	3.08	2.74	15.00	2.15	0.375	4.25	0.78	1.20
365	7.99	2.94	3.08	2.73	20.00	2.71	0.480	5.43	0.78	1.20
366	8.00	2.99	3.13	2.78	25.04	3.23	0.579	6.68	0.77	1.20
98	7.95	3.02	3.19	2.80	1.00	0.54	0.070	0.67	1.08	1.50
99	7.94	3.06	3.21	2.84	5.00	0.98	0.144	1.67	1.08	1.50
100	7.99	3.00	3.14	2.79	10.00	1.52	0.229	2.90	1.08	1.50
101	7.85	2.93	3.08	2.72	15.02	2.06	0.351	4.07	1.08	1.50
102	8.01	2.96	3.10	2.76	15.00	2.09	0.346	4.13	1.08	1.50
104	8.01	2.98	3.12	2.78	20.00	2.60	0.455	5.29	1.07	1.50
105	8.04	3.06	3.21	2.85	25.04	3.16	0.557	6.69	1.07	1.50

MEAN WETTED LENGTH = 3.5 BEAMS

696	7.99	3.46	3.57	3.30	1.00	0.89	0.125	1.36	0.11	0.56
697	7.98	3.53	3.67	3.33	4.98	1.71	0.256	3.14	0.07	0.56
698	7.96	3.47	3.61	3.27	10.00	2.81	0.428	5.35	0.07	0.56
699	7.97	3.49	3.63	3.28	14.98	4.13	0.650	7.98	0.06	0.56
700	7.93	3.51	3.67	3.30	20.00	5.06	0.806	9.81	0.05	0.56
701	7.86	3.51	3.67	3.30	25.04	5.55	0.905	10.93	0.06	0.56
668	8.00	3.41	3.52	3.24	1.00	0.81	0.122	1.19	0.17	0.61
669	7.99	3.49	3.59	3.32	1.00	0.85	0.128	1.25	0.16	0.61
670	8.01	3.59	3.73	3.39	5.00	1.66	0.259	3.08	0.11	0.61
671	8.01	3.50	3.64	3.30	5.00	1.55	0.242	2.86	0.13	0.61
672	8.00	3.50	3.64	3.30	10.00	2.60	0.413	5.10	0.12	0.61
673	7.99	3.48	3.62	3.28	15.00	3.75	0.604	7.46	0.11	0.61
674	7.92	3.54	3.68	3.33	20.04	4.75	0.784	9.58	0.10	0.61
675	7.85	3.51	3.67	3.29	25.04	5.19	0.875	10.48	0.11	0.61
598	7.99	3.55	3.66	3.38	1.00	0.78	0.114	1.20	0.32	0.76
600	8.01	3.50	3.63	3.31	5.00	1.36	0.211	2.56	0.27	0.76
602	8.02	3.44	3.59	3.23	10.00	2.14	0.327	4.41	0.27	0.76
603	8.00	3.45	3.59	3.24	15.00	3.10	0.497	6.58	0.25	0.76
605	7.94	3.58	3.74	3.36	20.00	4.02	0.662	8.63	0.24	0.76
606	7.93	3.56	3.71	3.34	20.04	3.96	0.654	8.46	0.25	0.76
607	7.89	3.53	3.68	3.32	25.04	4.48	0.752	9.65	0.25	0.76

TABLE I-19

TRIM = 8 DEGREES
MEAN WETTED LENGTH = 3.5 BEAMS

RUN	τ	λ	λ_k	λ_c	C_V^2	C_Δ	C_R	C_M	Z'	D
435	7.88	3.54	3.68	3.33	5.00	1.28	0.209	2.47	0.43	0.90
436	7.88	3.42	3.57	3.22	10.00	1.95	0.325	4.15	0.43	0.90
438	7.83	3.47	3.60	3.28	10.00	1.93	0.317	4.08	0.42	0.90
439	7.95	3.41	3.56	3.21	15.00	2.70	0.472	5.81	0.42	0.90
440	7.95	3.44	3.58	3.23	15.00	2.70	0.471	5.80	0.42	0.90
441	8.00	3.41	3.56	3.20	20.00	3.38	0.600	7.24	0.41	0.90
443	8.04	3.45	3.60	3.24	20.00	3.31	0.588	7.23	0.41	0.90
445	8.00	3.51	3.66	3.30	24.99	4.00	0.731	8.99	0.41	0.90
555	8.01	3.49	3.62	3.29	10.02	1.93	0.301	4.08	0.52	1.01
550	8.00	3.53	3.67	3.33	15.00	2.75	0.442	6.14	0.50	1.01
551	8.02	3.45	3.60	3.24	20.00	3.40	0.572	7.47	0.50	1.01
552	7.91	3.59	3.74	3.37	24.99	3.99	0.688	9.10	0.49	1.01
553	7.96	3.48	3.63	3.27	24.99	3.87	0.673	8.64	0.50	1.01
373	7.95	3.52	3.67	3.31	5.00	1.28	0.204	2.44	0.72	1.20
369	7.88	3.51	3.64	3.31	10.00	1.83	0.301	3.98	0.71	1.20
370	8.00	3.56	3.70	3.36	15.00	2.64	0.468	5.99	0.68	1.20
371	8.02	3.54	3.69	3.33	20.00	3.23	0.587	7.38	0.69	1.20
372	8.03	3.56	3.70	3.35	24.99	3.77	0.697	8.83	0.69	1.20
106	8.00	3.56	3.72	3.34	1.00	0.76	0.103	1.16	1.01	1.50
107	7.99	3.47	3.64	3.24	1.00	0.73	0.099	1.09	1.02	1.50
108	8.02	3.50	3.66	3.29	5.00	1.25	0.193	2.39	1.02	1.50
109	8.02	3.45	3.59	3.24	10.02	1.78	0.274	3.82	1.02	1.50
111	8.00	3.46	3.60	3.27	15.00	2.39	0.000	4.91	1.01	1.50
112	8.14	3.49	3.64	3.28	20.00	3.00	0.000	6.25	1.00	1.50
113	8.10	3.56	3.72	3.34	25.14	3.58	0.000	7.75	1.00	1.50

TABLE 2
DEADRISE = 20 DEGREES

TRIM = 2 DEGREES
MEAN WETTED LENGTH = 1.0 BEAMS

RUN	τ	λ	λ_k	λ_c	C_V^3	C_Δ	C_R	C_M	Z'	D
280	2.01	0.97	1.89	0.00	5.00	0.04	0.007	0.07	1.13	1.20
282	2.05	0.95	1.84	0.00	10.00	0.06	0.018	0.10	1.13	1.20
283	1.98	0.99	1.92	0.00	15.00	0.06	0.019	0.07	1.13	1.20
284	2.06	0.98	1.90	0.00	20.00	0.07	0.028	0.04	1.12	1.20
285	2.14	1.00	1.94	0.00	24.99	0.09	0.040	0.05	1.12	1.20

MEAN WETTED LENGTH = 2.0 BEAMS

287	2.00	1.92	3.44	0.33	5.00	0.12	0.020	0.16	1.07	1.20
288	2.06	2.02	3.49	0.50	5.00	0.14	0.023	0.18	1.07	1.20
289	2.04	2.05	3.53	0.50	10.00	0.19	0.053	0.27	1.07	1.20
290	2.03	1.99	3.48	0.44	15.00	0.24	0.076	0.34	1.07	1.20
291	2.08	2.06	3.52	0.53	20.00	0.30	0.102	0.43	1.06	1.20
292	2.13	2.17	3.67	0.62	24.99	0.36	0.128	0.51	1.06	1.20
293	2.15	2.08	3.56	0.54	24.99	0.36	0.128	0.49	1.06	1.20

MEAN WETTED LENGTH = 2.5 BEAMS

294	2.07	2.56	4.00	1.06	5.00	0.20	0.032	0.32	1.05	1.20
295	2.04	2.42	3.89	0.89	10.00	0.24	0.062	0.40	1.05	1.20
297	1.96	2.53	4.00	1.00	10.00	0.25	0.065	0.40	1.05	1.20
298	1.97	2.56	4.00	1.07	15.00	0.32	0.096	0.53	1.05	1.20
299	2.02	2.53	4.00	1.00	20.00	0.38	0.122	0.65	1.05	1.20
300	2.07	2.53	4.00	1.00	25.04	0.45	0.154	0.77	1.05	1.20

TABLE 2-2

TRIM = 4 DEGREES
MEAN WETTED LENGTH = 1.0 BEAM

RUN	τ	λ	λ_k	λ_c	C_V^3	C_Δ	C_R	C_M	Z'	D
206	3.99	0.91	1.75	0.00	1.00	0.10	0.005	0.17	1.08	1.20
207	3.99	0.94	1.82	0.00	1.00	0.11	0.006	0.17	1.08	1.20
208	3.99	1.13	1.88	0.32	5.00	0.19	0.024	0.24	1.07	1.20
209	3.99	0.94	1.70	0.11	5.00	0.18	0.023	0.23	1.08	1.20
210	3.97	1.02	1.77	0.22	10.02	0.29	0.045	0.33	1.08	1.20
211	3.95	1.04	1.79	0.23	16.47	0.41	0.073	0.43	1.07	1.20
212	3.96	1.04	1.78	0.23	14.87	0.38	0.063	0.38	1.08	1.20
213	3.97	0.96	1.70	0.17	20.04	0.47	0.078	0.44	1.08	1.20
214	3.98	0.99	1.74	0.18	24.99	0.56	0.099	0.52	1.08	1.20
MEAN WETTED LENGTH = 2 BEAMS										
215	3.99	2.10	2.92	1.22	1.00	0.16	0.011	0.21	1.00	1.20
216	4.00	2.03	2.74	1.27	5.00	0.27	0.036	0.37	1.01	1.20
217	3.98	1.95	2.67	1.18	10.02	0.41	0.067	0.58	1.01	1.20
218	3.96	2.02	2.76	1.23	15.00	0.56	0.102	0.82	1.01	1.20
219	4.00	1.98	2.71	1.20	20.00	0.70	0.126	1.00	1.01	1.20
220	4.04	1.94	2.66	1.16	24.99	0.84	0.157	1.18	1.01	1.20
221	4.04	1.98	2.70	1.21	24.99	0.85	0.160	1.22	1.01	1.20
MEAN WETTED LENGTH = 2.5 BEAMS										
222	3.94	2.44	3.37	1.44	1.00	0.21	0.013	0.28	0.97	1.20
223	4.00	2.51	3.23	1.73	5.00	0.35	0.045	0.54	0.97	1.20
224	3.99	2.49	3.20	1.71	10.00	0.52	0.082	0.85	0.97	1.20
226	3.97	2.49	3.20	1.71	15.00	0.69	0.117	1.16	0.97	1.20
227	4.04	2.44	3.16	1.66	20.00	0.85	0.150	1.44	0.97	1.20
228	4.06	2.51	3.18	1.78	24.99	1.02	0.187	1.75	0.97	1.20

TABLE 2-3

TRIM = 6 DEGREES

MEAN WETTED LENGTH = 1.0 BEAM

RUN	τ	λ	λ_k	λ_c	C_v^a	C_Δ	C_R	C_M	Z'	D
229	5.99	0.95	1.52	0.31	1.00	0.09	0.002	0.11	1.04	1.20
230	5.99	1.00	1.45	0.48	5.00	0.21	0.025	0.19	1.05	1.20
231	5.97	0.97	1.44	0.44	10.00	0.38	0.053	0.32	1.05	1.20
232	5.94	1.00	1.47	0.47	15.02	0.56	0.080	0.47	1.04	1.20
233	5.98	1.00	1.46	0.48	20.00	0.73	0.107	0.60	1.04	1.20
234	6.02	1.03	1.50	0.50	24.99	0.88	0.136	0.72	1.04	1.20

MEAN WETTED LENGTH = 2.0 BEAMS

235	6.00	2.07	2.58	1.51	1.00	0.23	0.021	0.29	0.94	1.20
236	5.99	2.02	2.47	1.51	5.00	0.41	0.056	0.56	0.94	1.20
237	5.97	2.01	2.46	1.51	10.00	0.66	0.102	0.93	0.94	1.20
238	5.93	2.00	2.44	1.49	15.00	0.92	0.146	1.31	0.94	1.20
239	6.02	1.99	2.43	1.48	20.00	1.17	0.190	1.66	0.94	1.20
240	6.08	1.99	2.44	1.47	24.99	1.38	0.233	1.96	0.94	1.20

MEAN WETTED LENGTH = 2.5 BEAMS

241	6.00	2.60	3.09	2.06	1.00	0.30	0.030	0.39	0.89	1.20
242	5.98	2.58	3.06	2.04	1.00	0.29	0.027	0.37	0.89	1.20
243	6.00	2.50	2.93	2.01	5.00	0.53	0.072	0.81	0.89	1.20
244	5.97	2.48	2.92	1.98	10.00	0.81	0.122	1.32	0.89	1.20
245	5.94	2.46	2.90	1.95	15.00	1.10	0.175	1.84	0.89	1.20
246	6.05	2.47	2.92	1.96	20.00	1.42	0.232	2.40	0.88	1.20
247	6.10	2.56	3.01	2.04	24.99	1.69	0.287	2.94	0.88	1.20

MEAN WETTED LENGTH = 3.5 BEAMS

248	5.99	3.53	3.97	3.03	10.00	1.18	0.178	2.44	0.78	1.20
249	6.00	3.58	4.00	3.10	10.00	1.19	0.207	2.53	0.78	1.20
250	6.04	3.44	3.91	2.91	25.04	2.19	0.385	4.89	0.78	1.20
251	6.02	3.44	3.89	2.93	20.00	1.91	0.320	4.20	0.78	1.20
252	5.99	3.49	3.93	2.98	15.00	1.56	0.256	3.45	0.78	1.20
253	5.99	3.53	3.98	3.03	10.00	1.20	0.181	2.58	0.78	1.20

TABLE 2-4

TRIM = 8 DEGREES
MEAN WETTED LENGTH = 1.0 BEAM

RUN	τ	λ	λ_k	λ_c	C_V^a	C_Δ	C_R	C_M	Z'	D
256	7.82	1.07	1.40	0.69	5.00	0.32	0.046	0.31	1.01	1.20
257	7.77	1.00	1.33	0.61	10.00	0.56	0.089	0.49	1.02	1.20
258	7.85	1.00	1.33	0.60	14.98	0.81	0.134	0.66	1.02	1.20
259	7.75	0.98	1.31	0.59	20.00	1.04	0.176	0.82	1.02	1.20
260	7.90	1.00	1.33	0.61	24.99	1.28	0.217	1.01	1.02	1.20
MEAN WETTED LENGTH = 2.0 BEAMS										
261	7.87	2.12	2.44	1.74	5.00	0.59	0.096	0.80	0.87	1.20
262	7.88	2.04	2.36	1.67	5.00	0.56	0.091	0.74	0.88	1.20
263	7.77	2.01	2.33	1.63	10.00	0.94	0.166	1.28	0.89	1.20
264	7.88	1.97	2.28	1.61	15.00	1.32	0.239	1.82	0.89	1.20
265	7.93	1.97	2.29	1.60	20.00	1.68	0.304	2.28	0.88	1.20
266	7.97	2.02	2.34	1.63	24.99	2.06	0.381	2.89	0.88	1.20
267	7.87	1.99	2.30	1.61	5.00	0.57	0.092	0.76	0.89	1.20
MEAN WETTED LENGTH = 2.5 BEAMS										
268	7.88	2.54	2.86	2.17	5.00	0.77	0.123	1.22	0.82	1.20
269	7.85	2.49	2.79	2.12	10.00	1.23	0.213	2.06	0.82	1.20
270	7.91	2.44	2.76	2.07	14.98	1.68	0.298	2.85	0.82	1.20
271	7.95	2.41	2.71	2.04	20.00	2.10	0.377	3.56	0.81	1.20
272	8.03	2.45	2.76	2.08	20.00	2.17	0.392	3.68	0.81	1.20
273	8.02	2.55	2.87	2.18	24.99	2.60	0.485	4.60	0.80	1.20
MEAN WETTED LENGTH = 3.5 BEAMS										
274	7.96	3.50	3.79	3.14	5.00	1.21	0.205	2.22	0.67	1.20
275	7.90	3.51	3.80	3.17	10.00	1.76	0.313	3.69	0.68	1.20
276	8.00	3.39	3.68	3.04	15.00	2.29	0.422	4.84	0.67	1.20
277	8.00	3.44	3.73	3.08	15.00	2.34	0.428	5.01	0.67	1.20
278	8.05	3.45	3.77	3.07	20.00	2.92	0.543	6.35	0.66	1.20
279	7.76	3.57	3.90	3.19	24.99	3.43	0.655	7.82	0.65	1.20

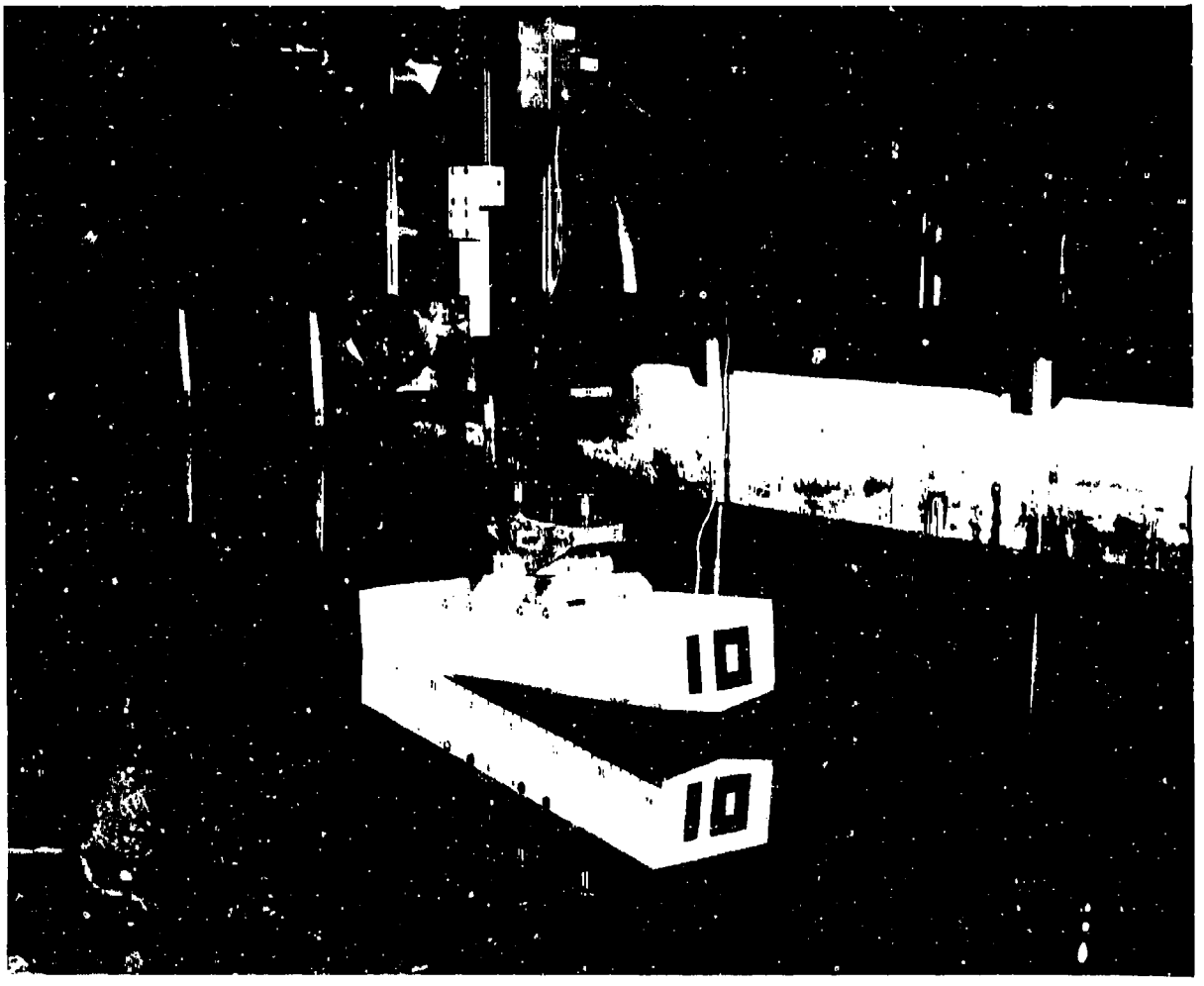
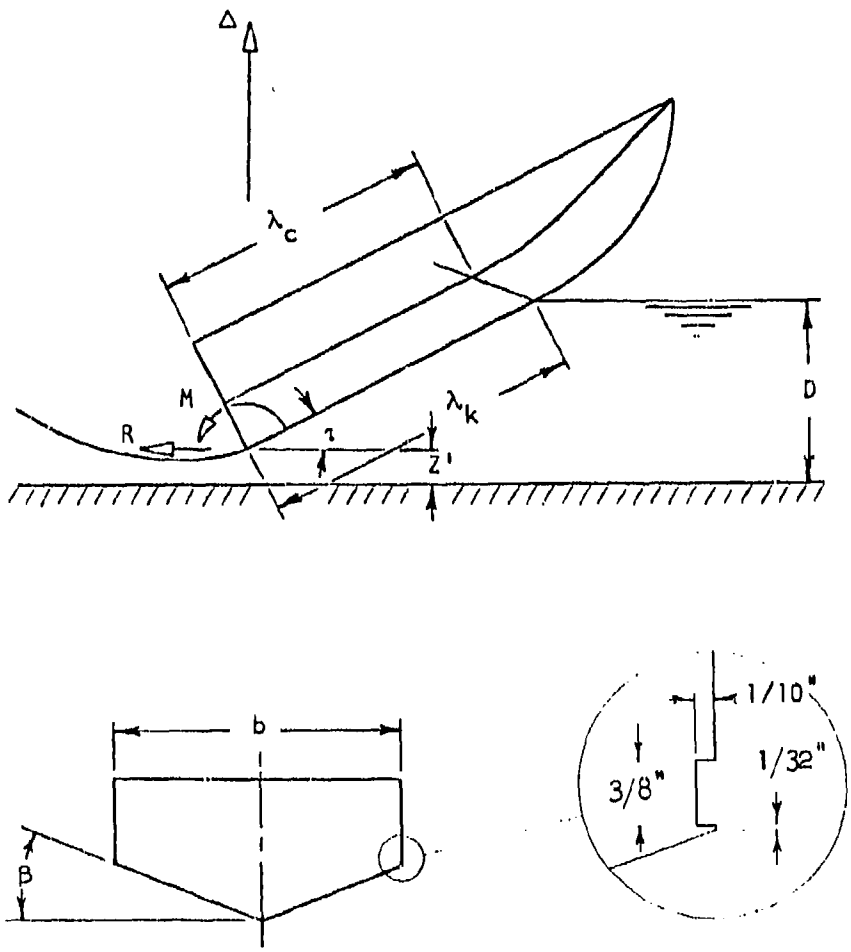


FIGURE 1
MODEL SET-UP INCLUDING FALSE BOTTOM



View Perpendicular to Transom

FIGURE 2. DEFINITION SKETCH WITH CHINE DETAIL

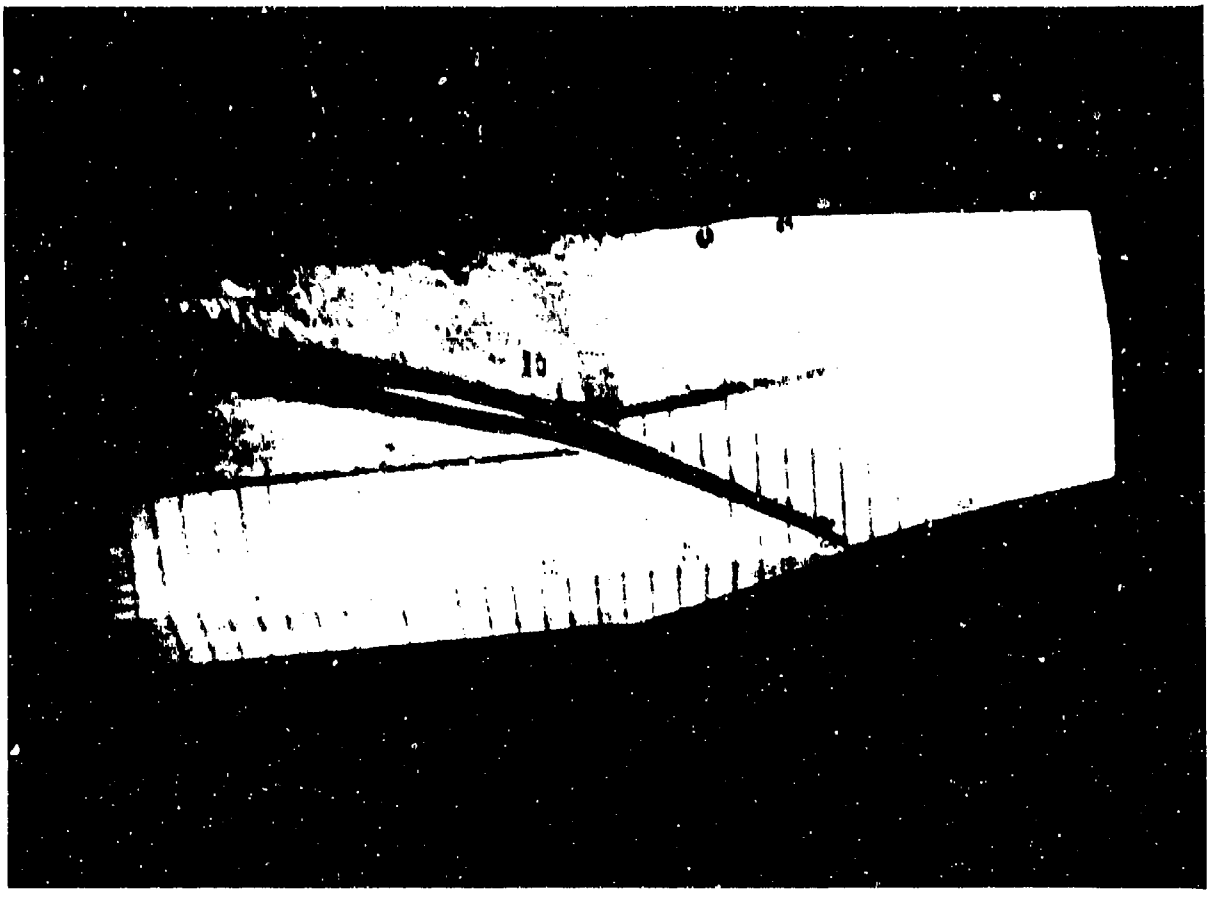


FIGURE 3
UNDERWATER VIEW SHOWING STAGNATION LINE

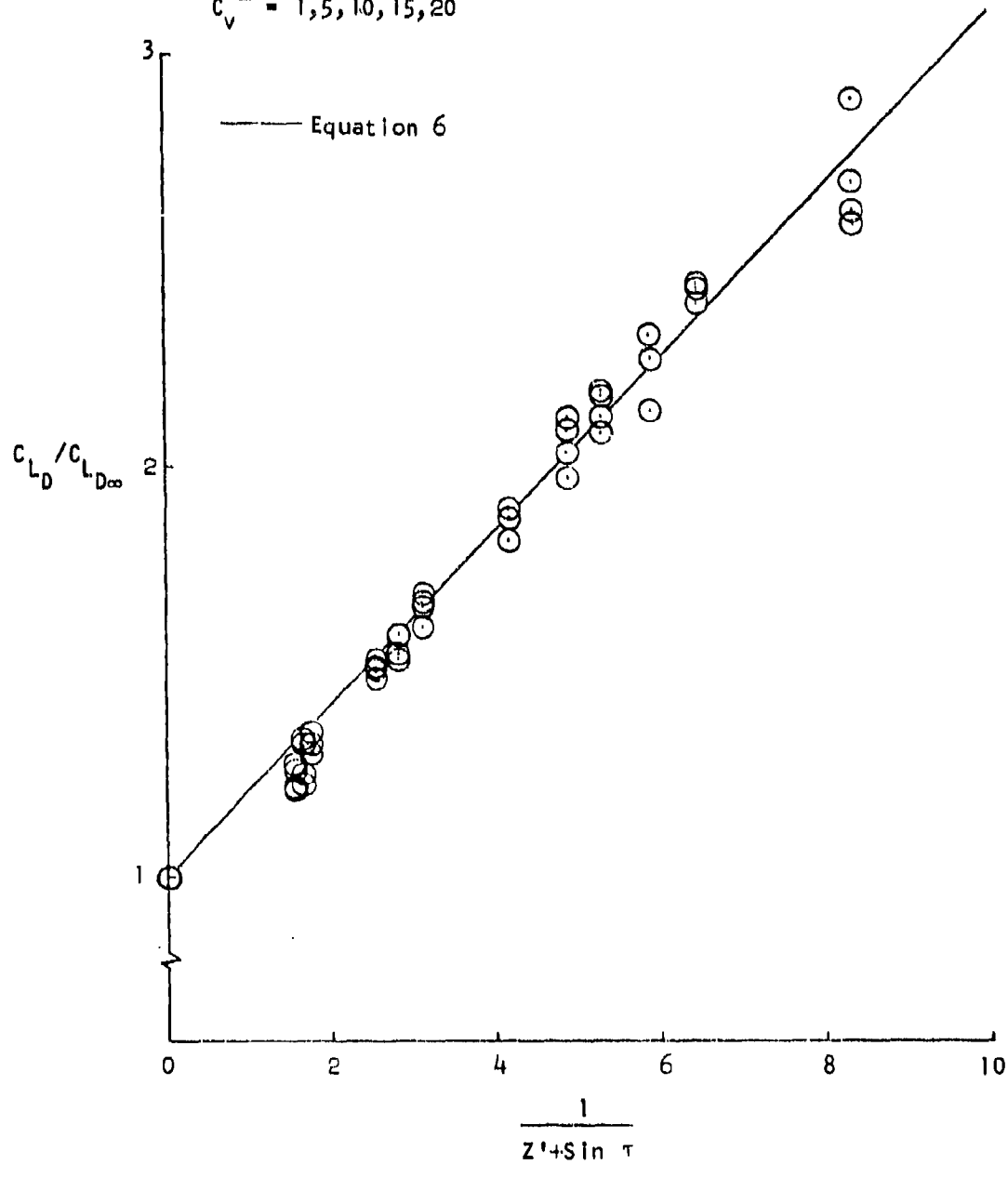


FIGURE 4. LIFT RATIO VERSUS RECIPROCAL DEPTH

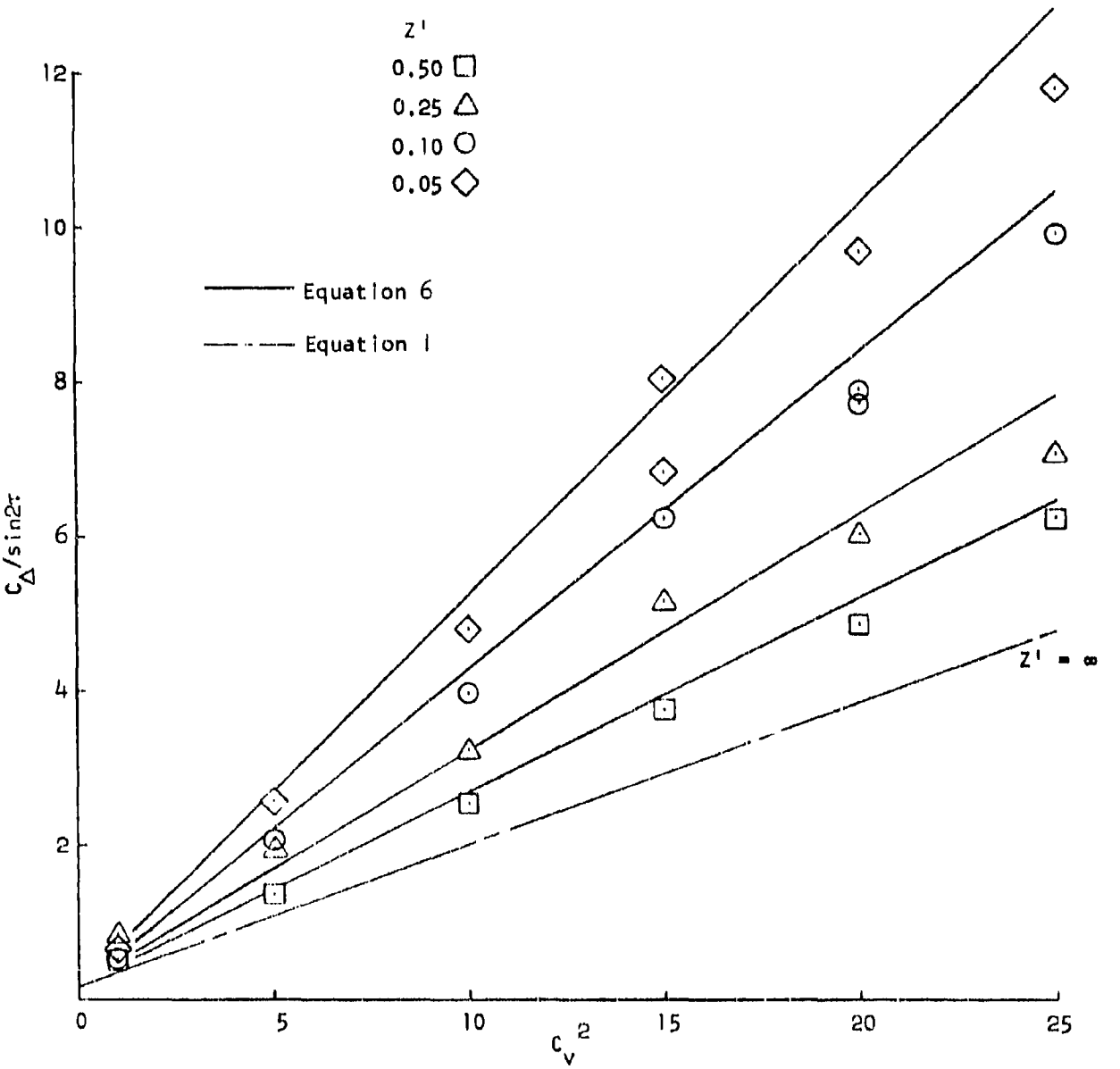


FIGURE 5. LIFT AT 4 DEGREES TRIM
AND ONE BEAM MEAN WETTED LENGTH

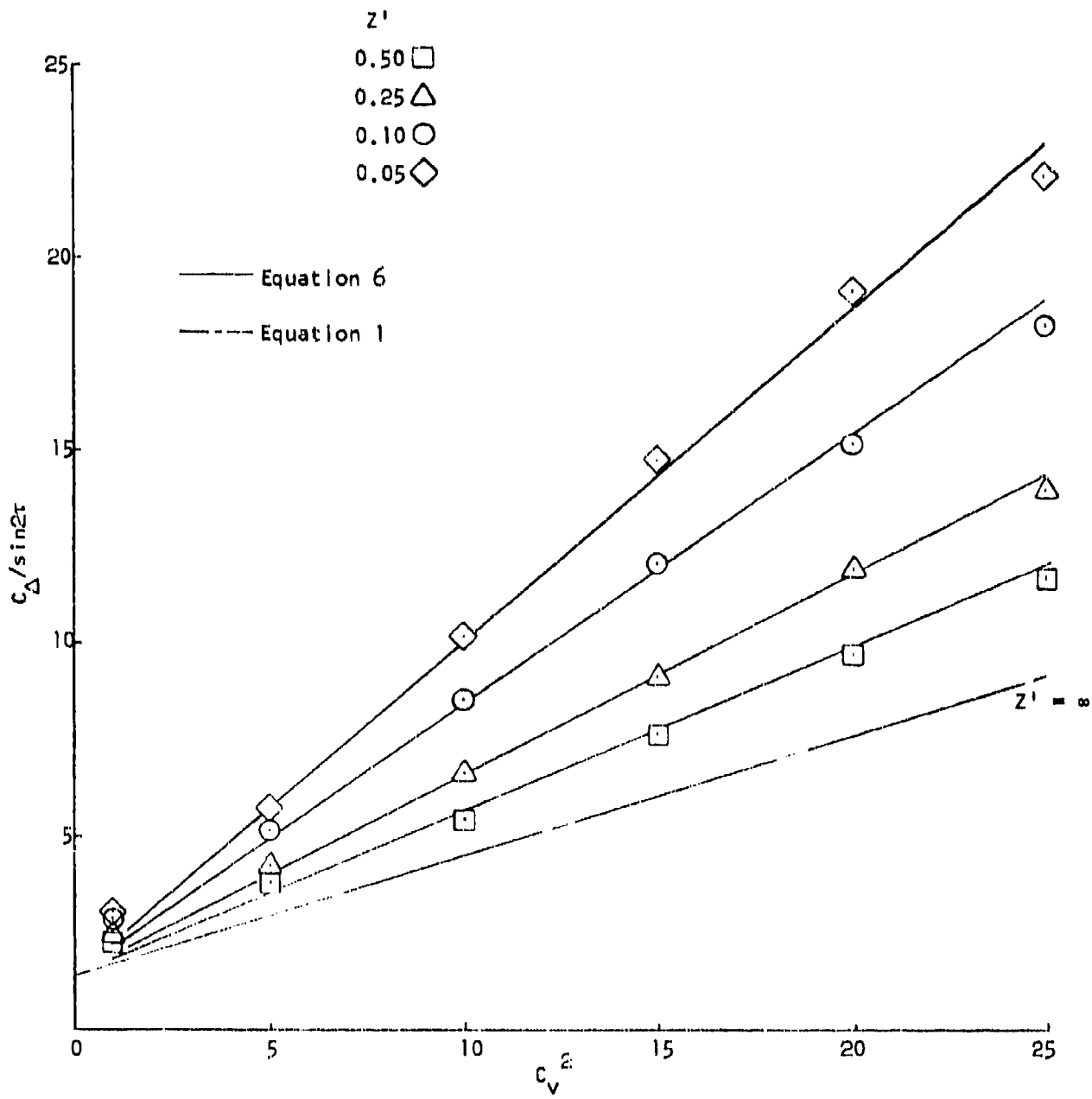


FIGURE 6. LIFT AT 4 DEGREES TRIM
AND THREE BEAMS WETTED LENGTH

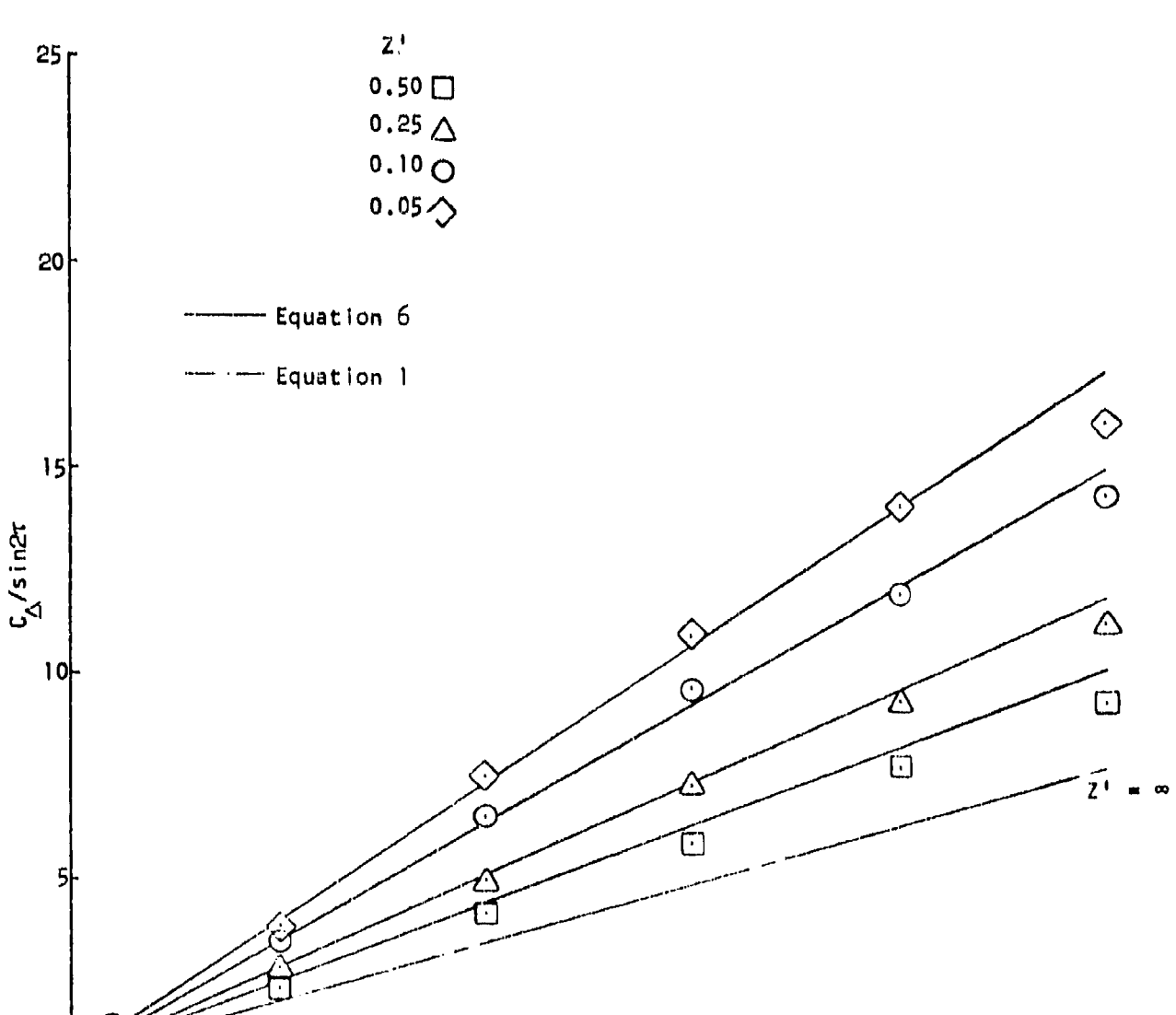


FIGURE 7. LIFT AT 6 DEGREES TRIM AND TWO BEAMS MEAN WETTED LENGTH

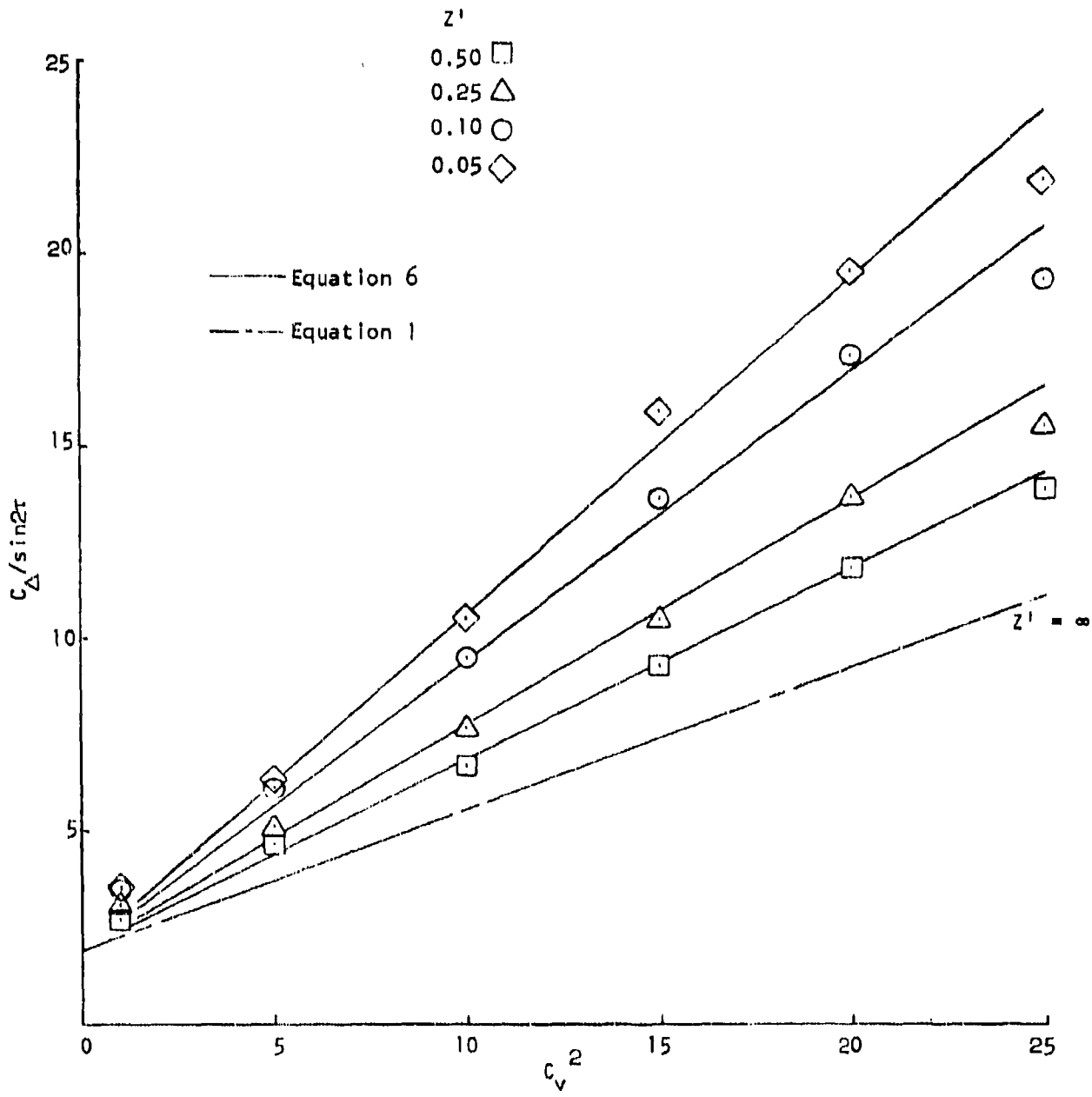


FIGURE 8. LIFT AT 6 DEGREES TRIM
AND 3.5 BEAMS MEAN WETTED LENGTH

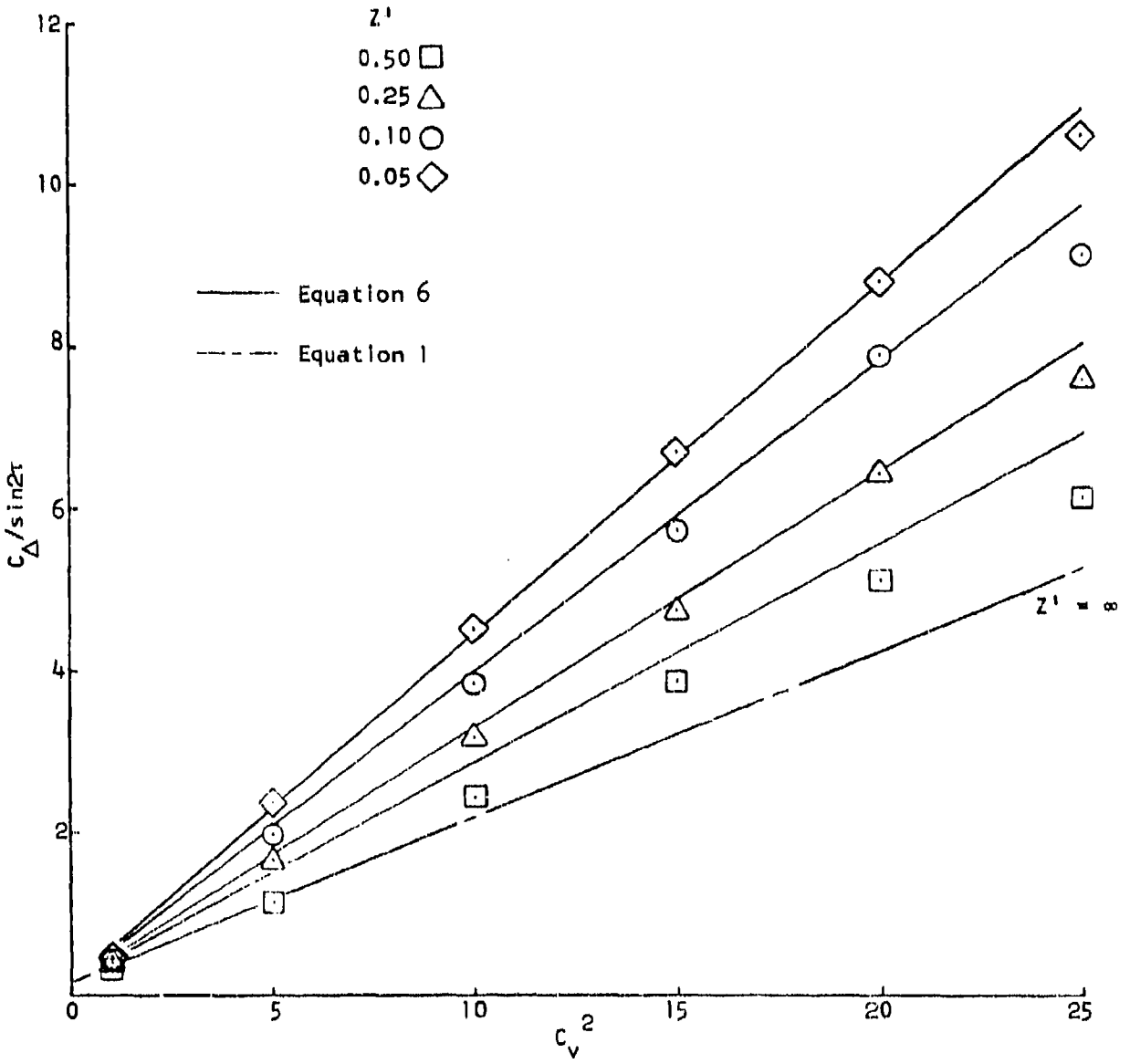


FIGURE 9. LIFT AT 8 DEGREES TRIM
AND ONE BEAM MEAN WETTED LENGTH

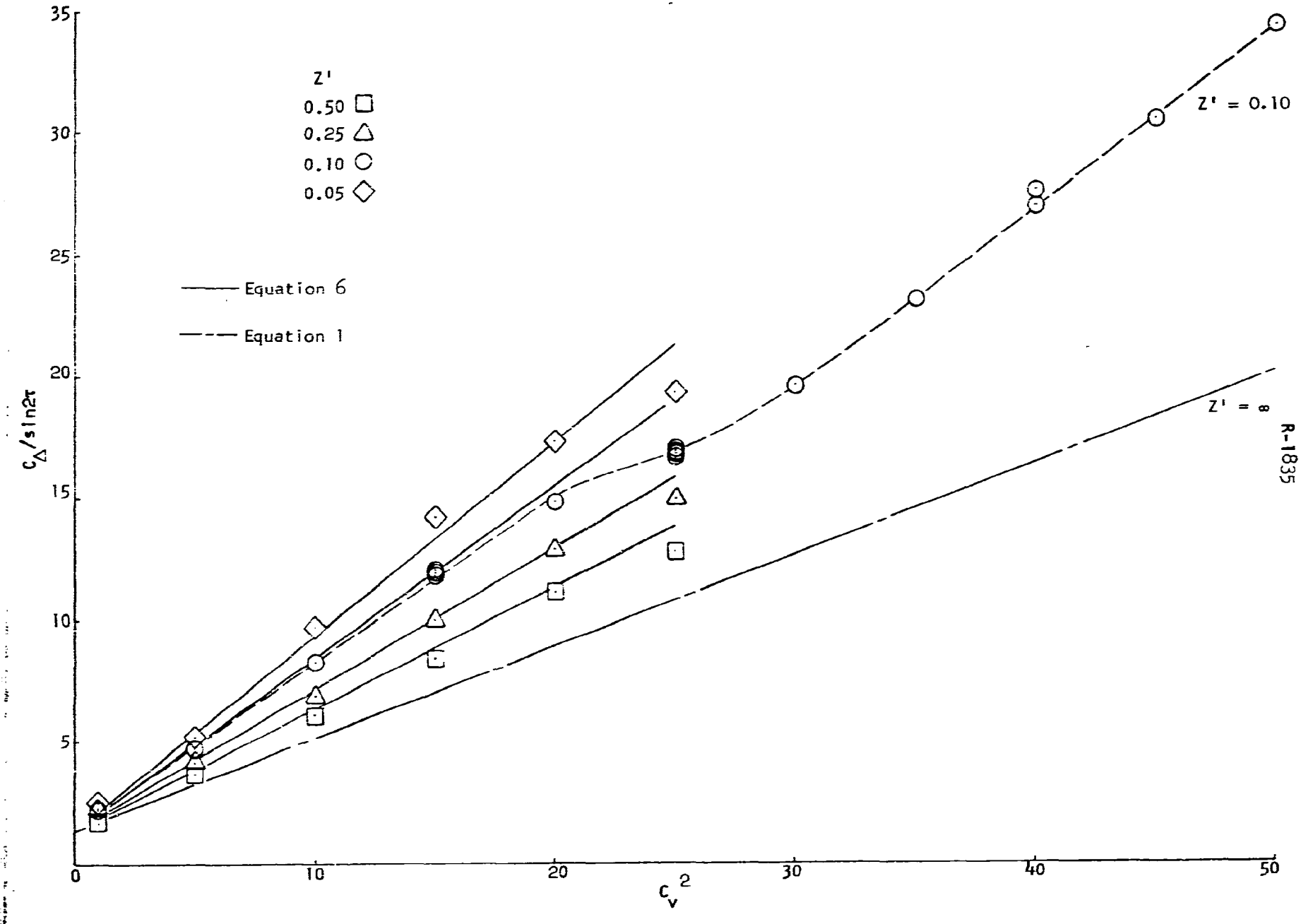


FIGURE 10. LIFT AT 8 DEGREES TRIM AND THREE BEAMS MEAN WETTED LENGTH

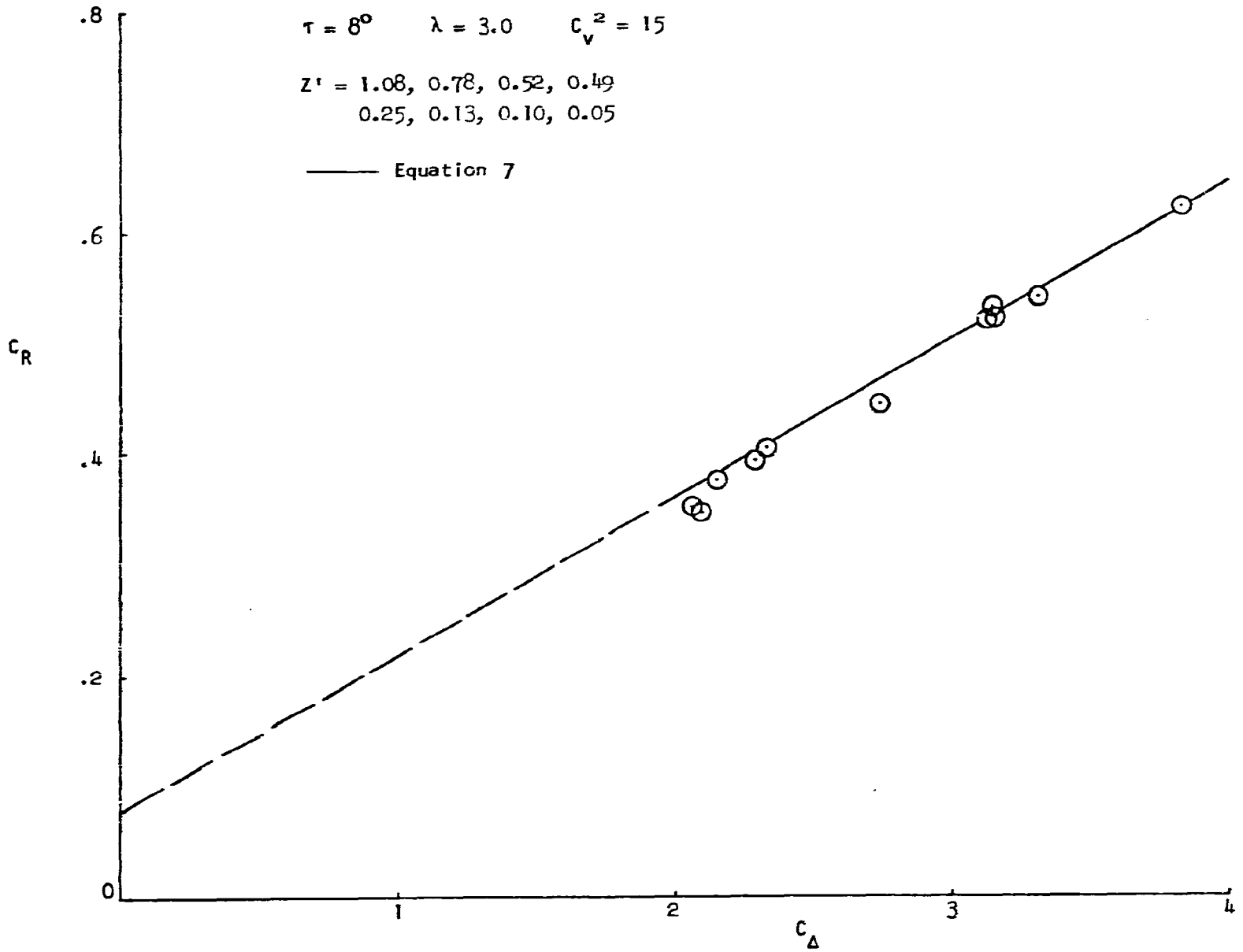


FIGURE 11. RESISTANCE VERSUS LIFT

R-1835

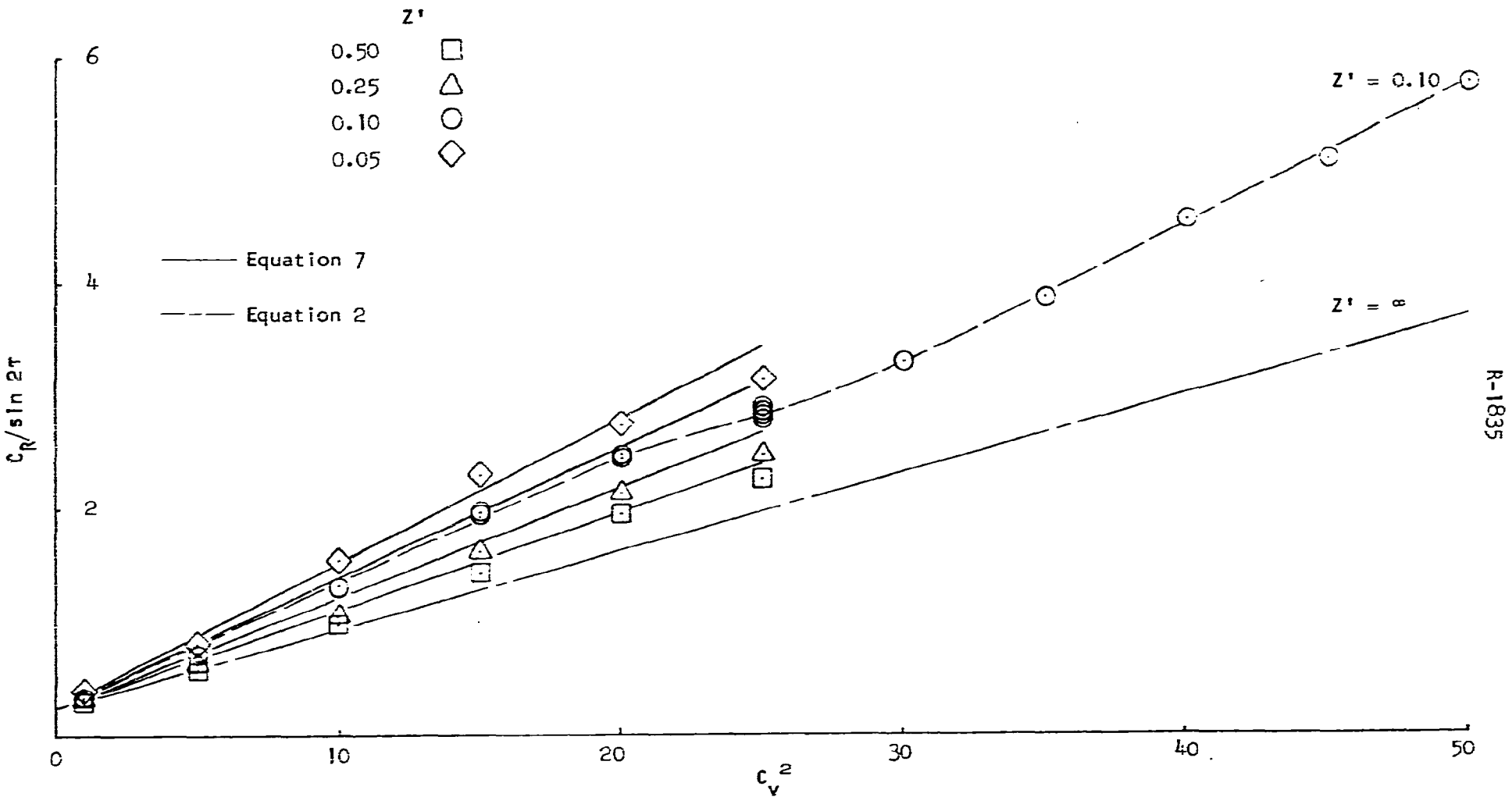


FIGURE 12. RESISTANCE AT 8 DEGREES TRIM AND THREE BEAMS MEAN WETTED LENGTH

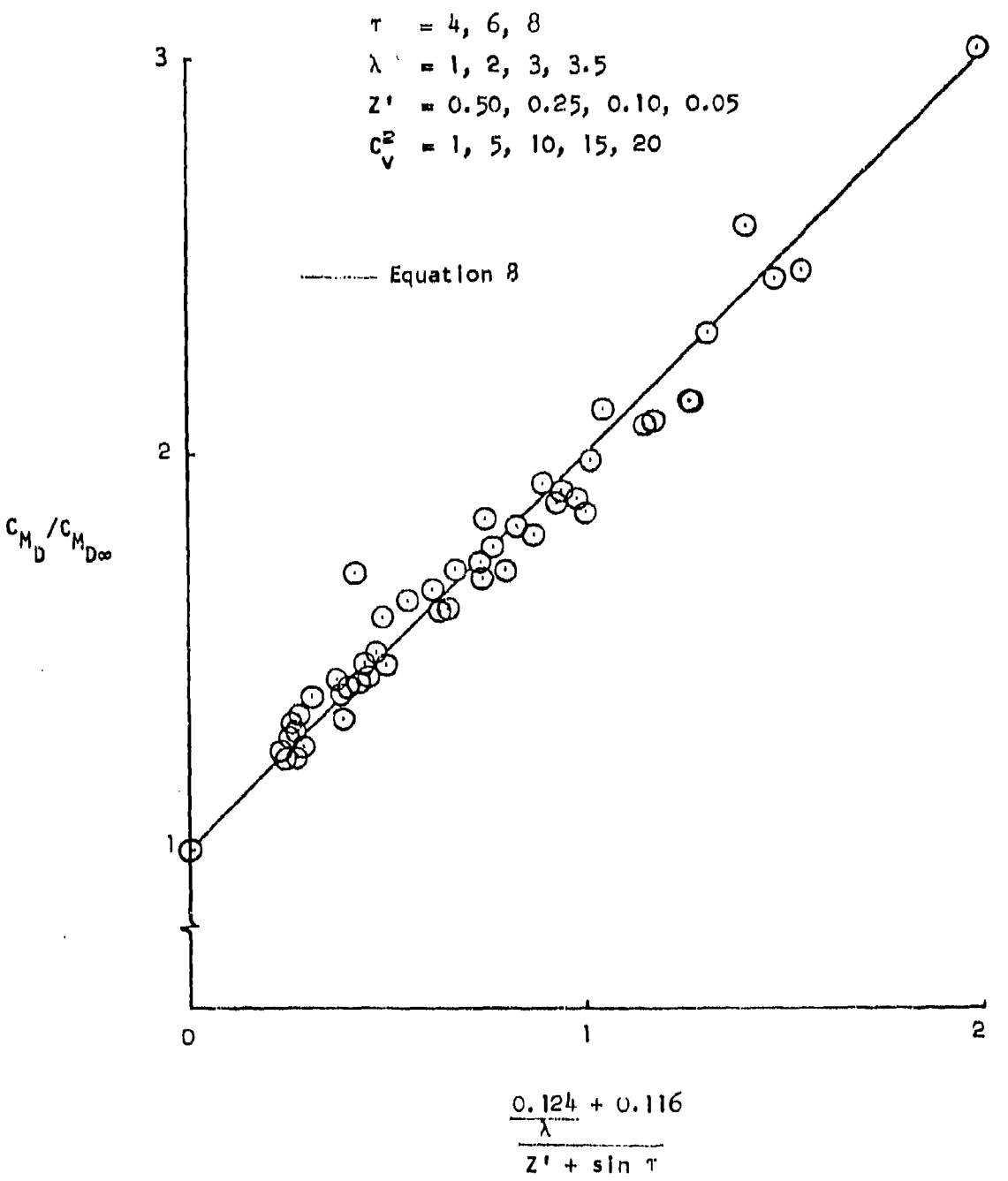


FIGURE 13. MOMENT RATIO VERSUS RECIPROCAL DEPTH

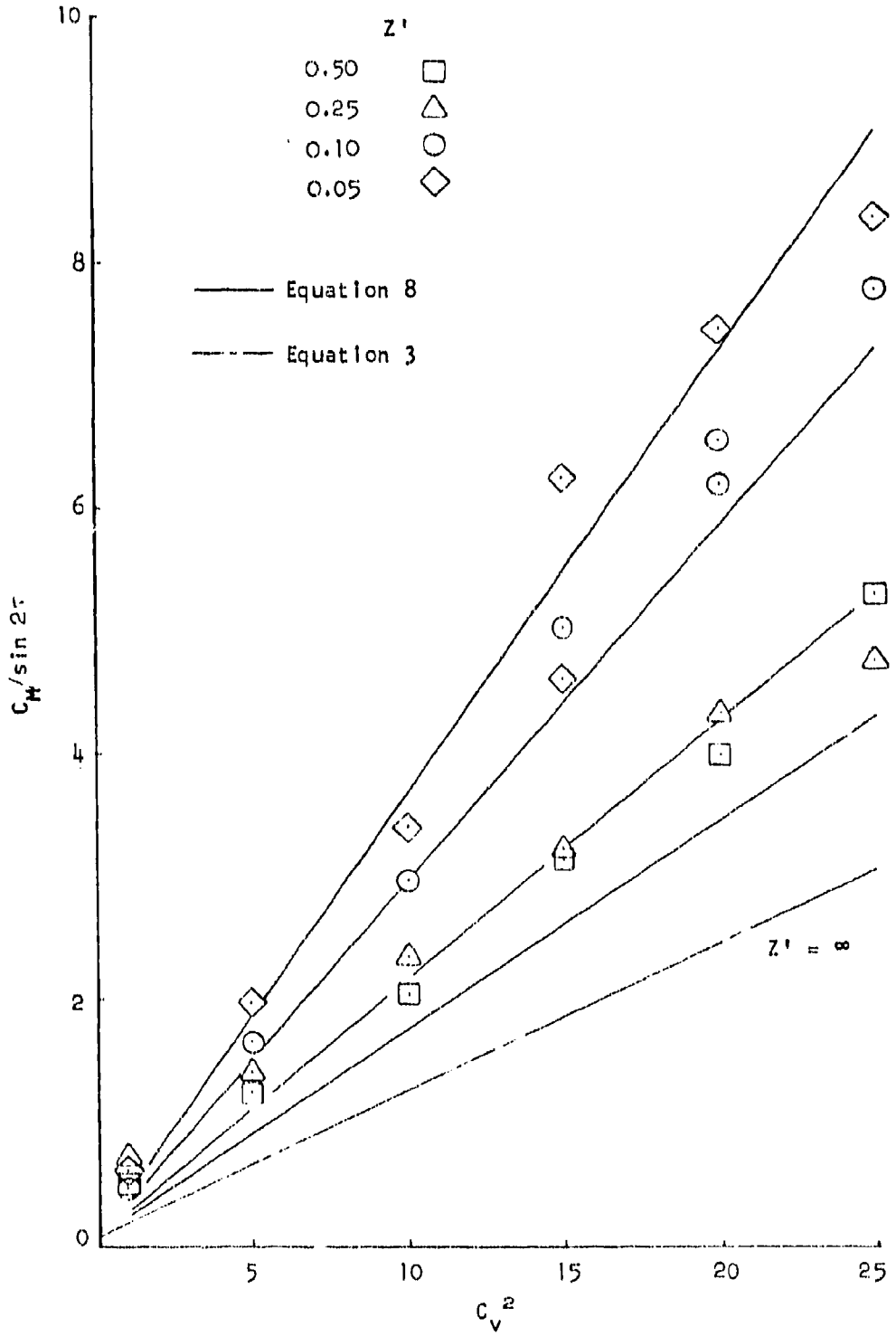


FIGURE 14. MOMENT AT 4 DEGREES TRIM AND ONE BEAM MEAN WETTED LENGTH

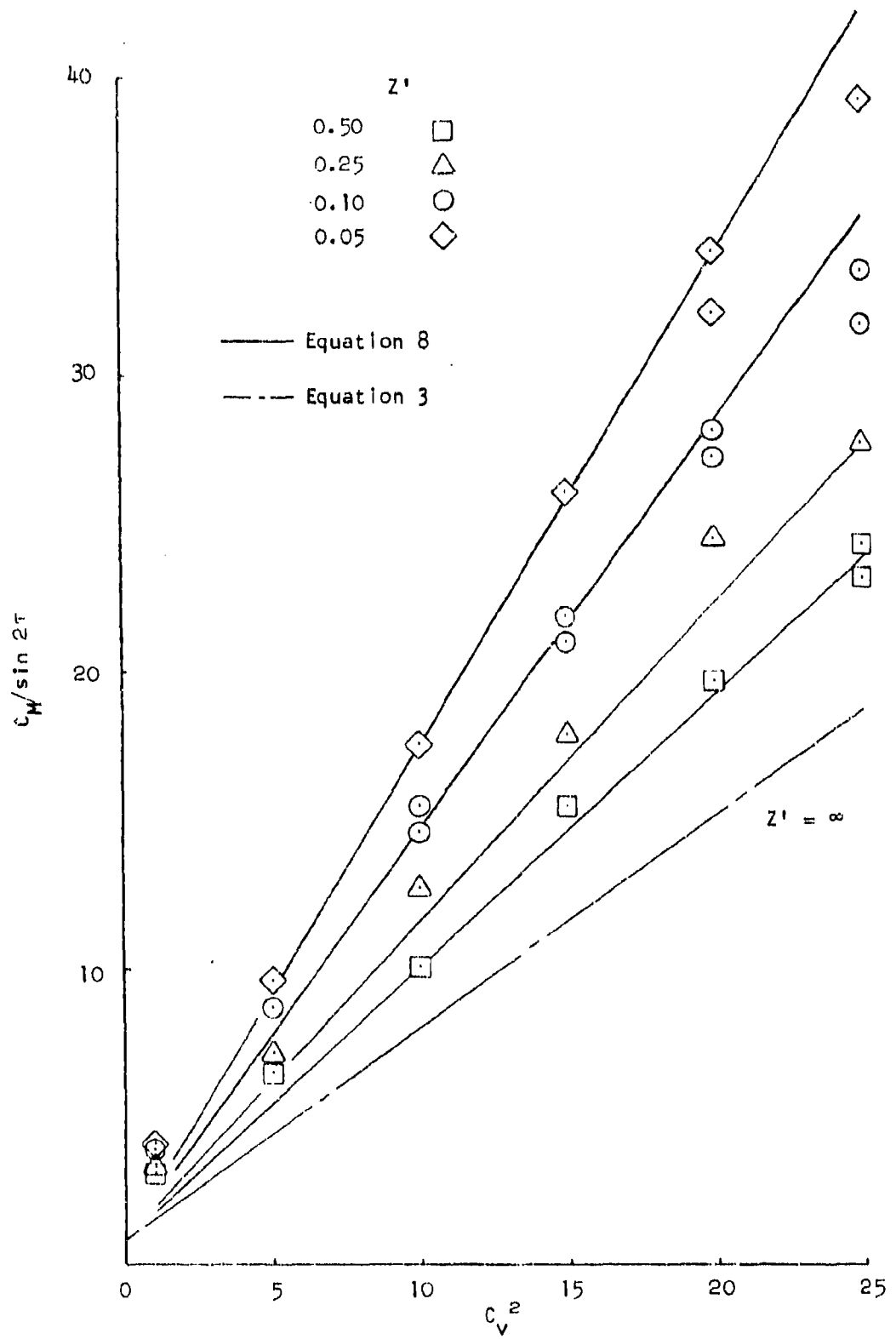


FIGURE 15. MOMENT AT 4 DEGREES TRIM AND THREE BEAMS MEAN WETTED LENGTH

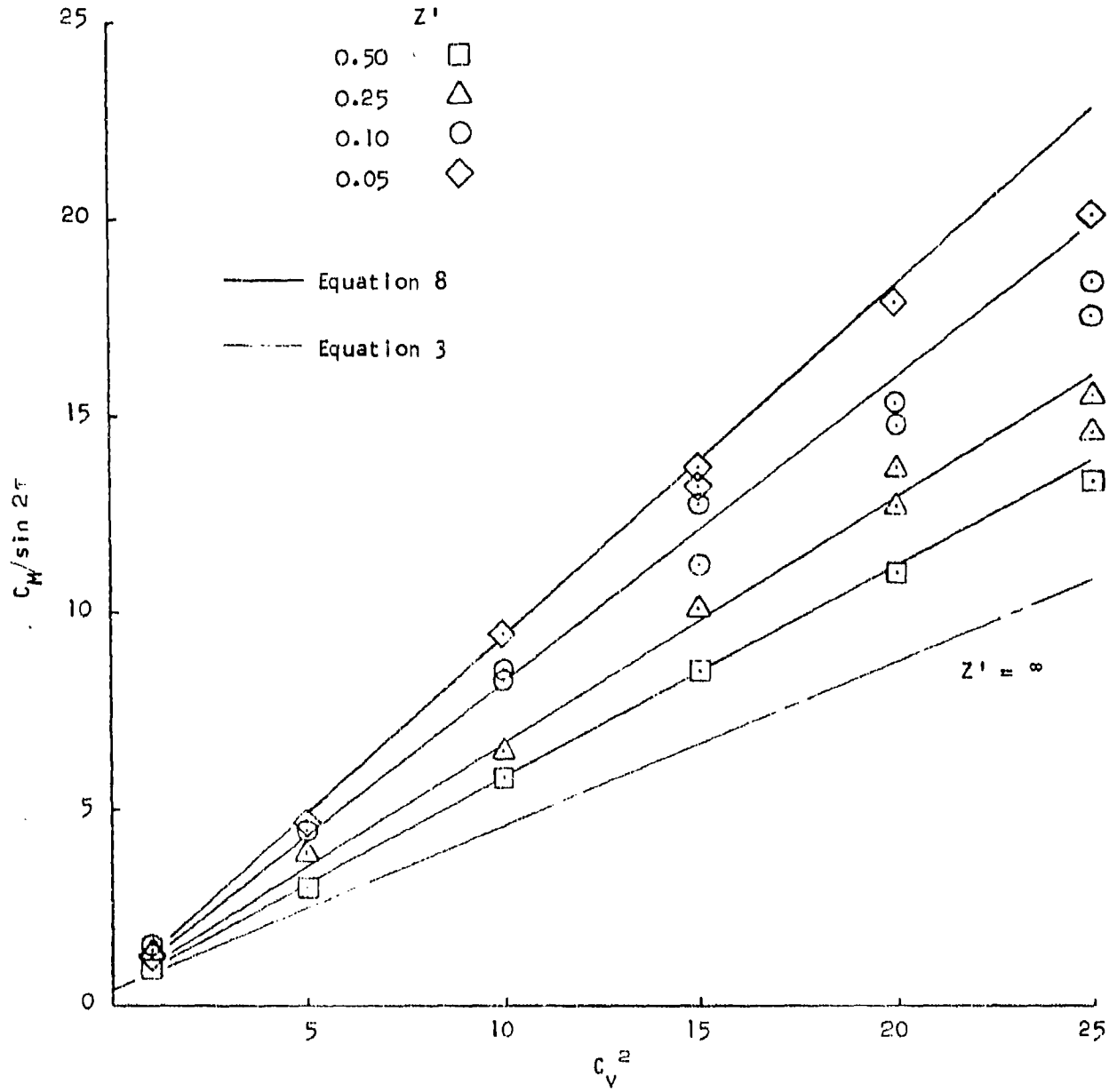


FIGURE 16. MOMENT AT 6 DEGREES TRIM
AND TWO BEAMS MEAN WETTED LENGTH

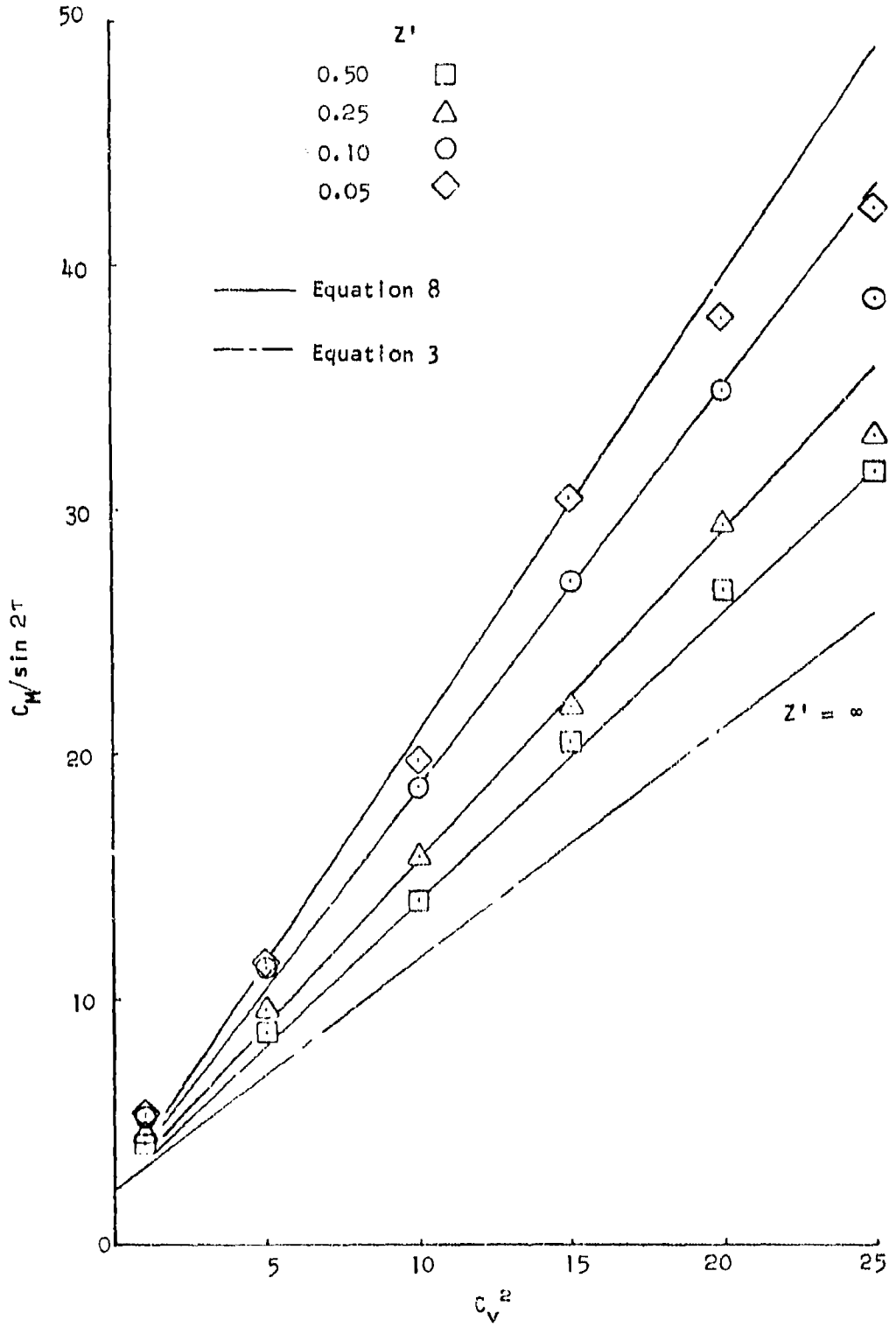


FIGURE 17. MOMENT AT 6 DEGREES TRIM AND 3.5 BEAMS MEAN WETTED LENGTH

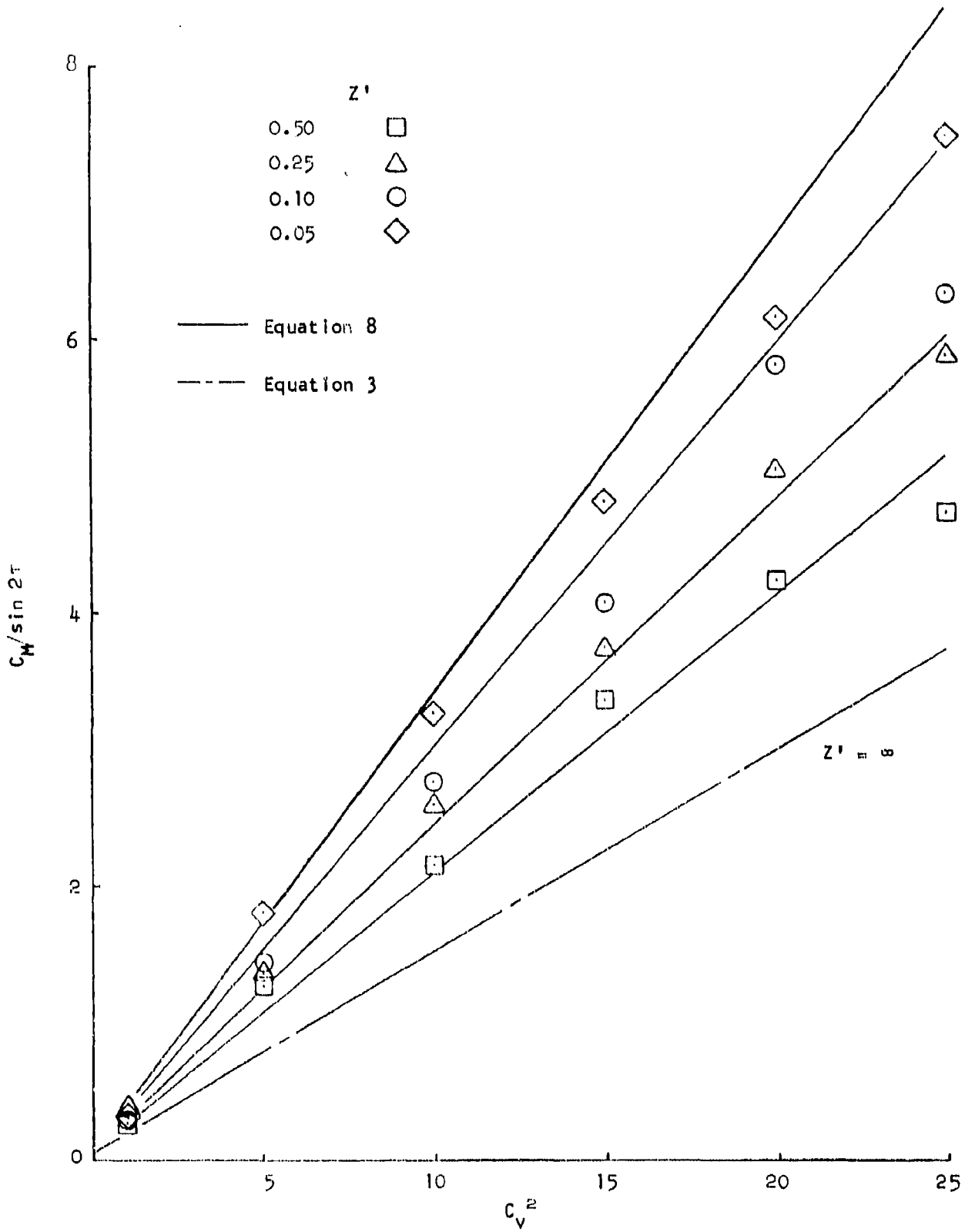


FIGURE 18. MOMENT AT 8 DEGREES TRIM AND ONE BEAM MEAN WETTED LENGTH

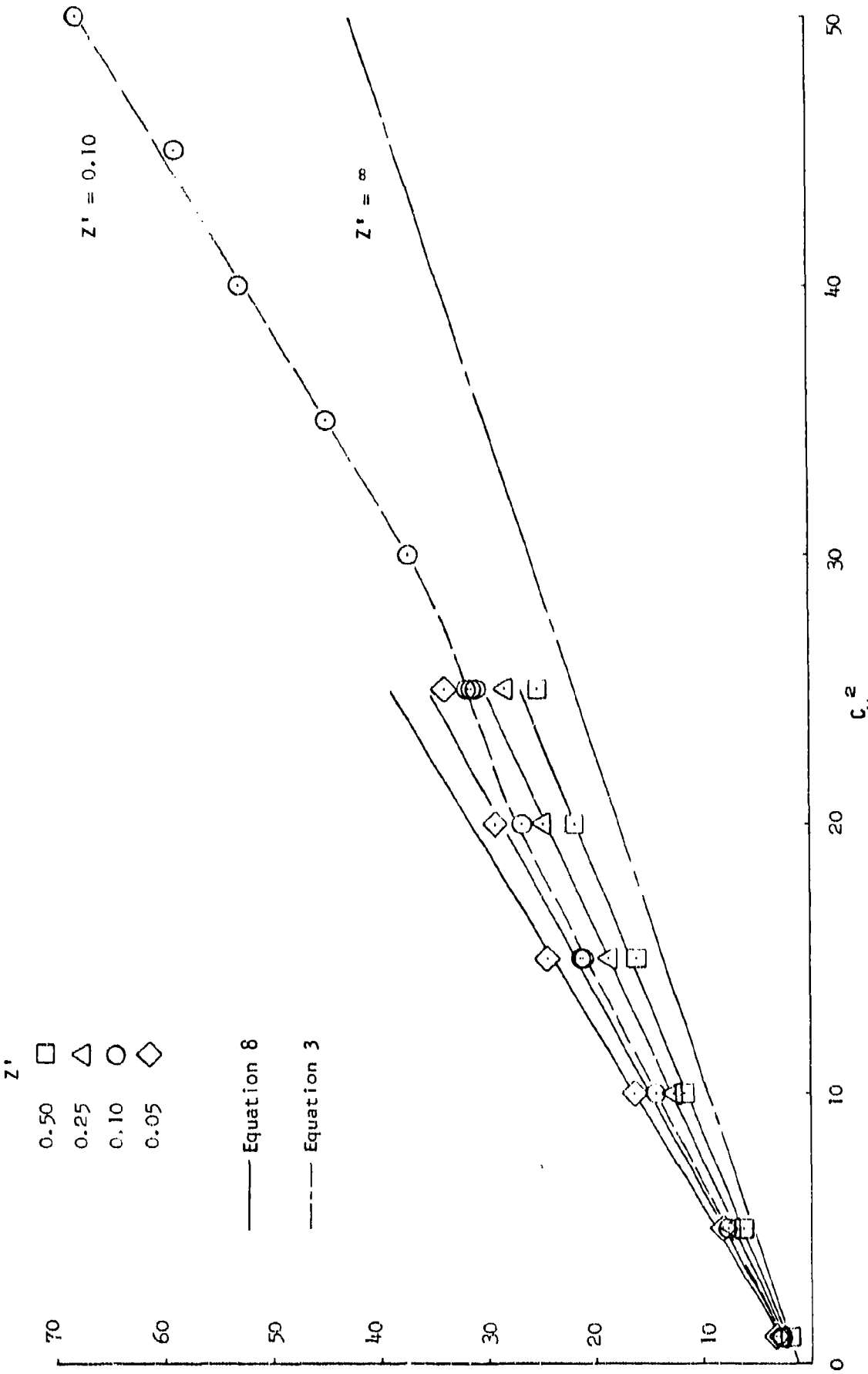


FIGURE 19. MOMENT AT 8^o TRIM AND 3 BEAMS MEAN WETTED LENGTH

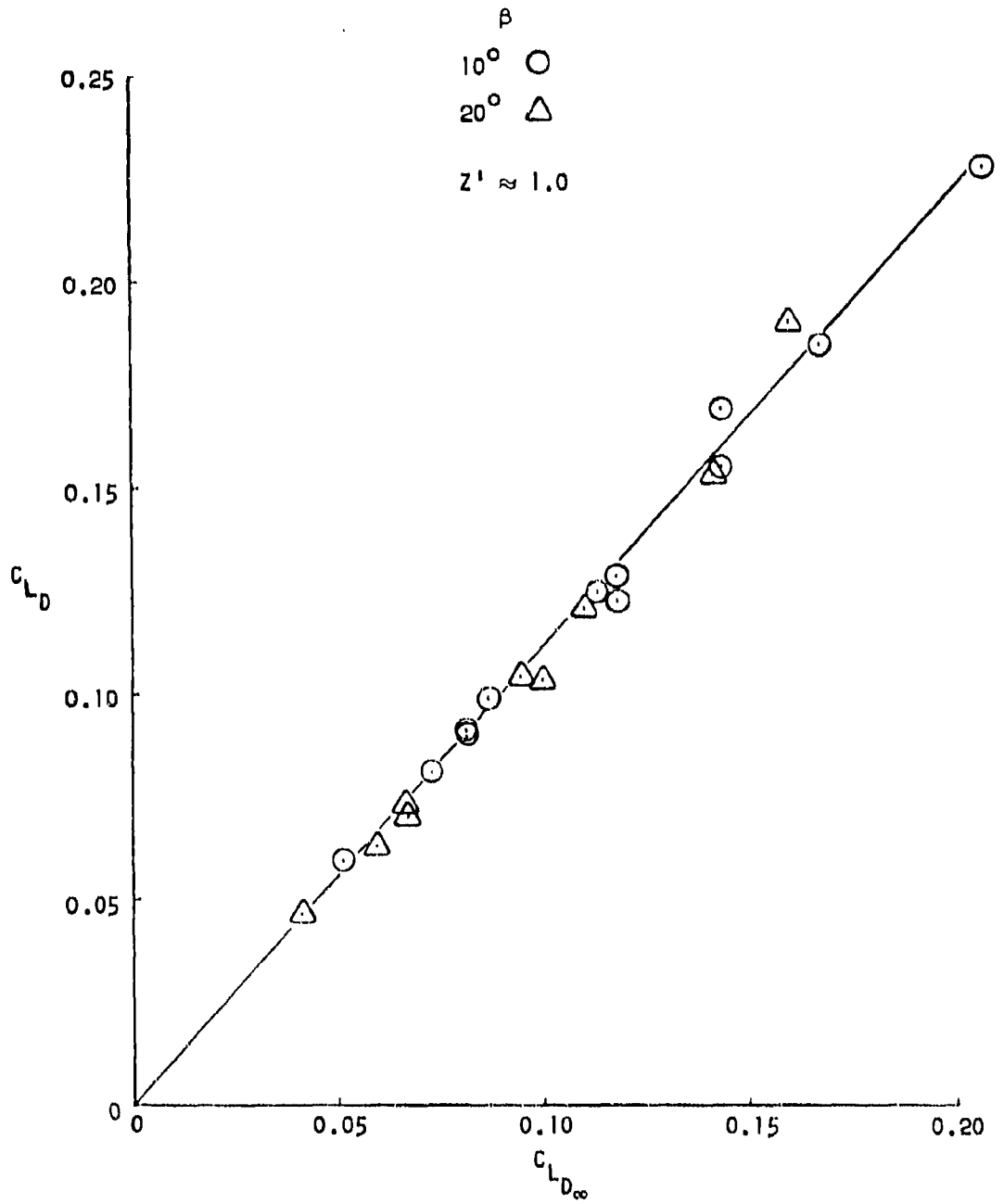


FIGURE 20 LIFT COMPARISON OF 10 AND 20 DEGREES DEADRISE AT SIMILAR DEPTH

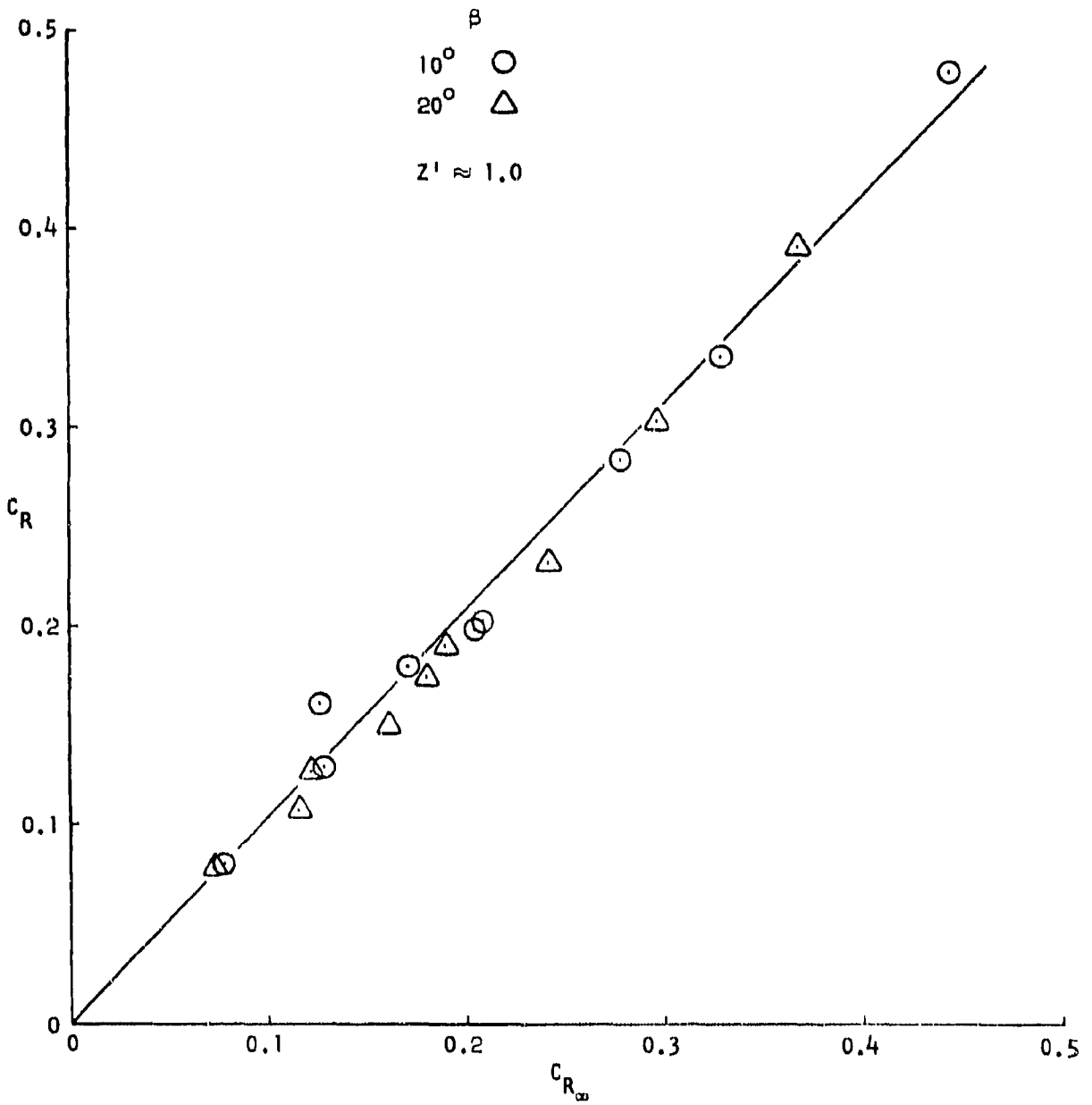


FIGURE 21 DRAG COMPARISON OF 10 AND 20 DEGREES DEADRISE AT SIMILAR DEPTH

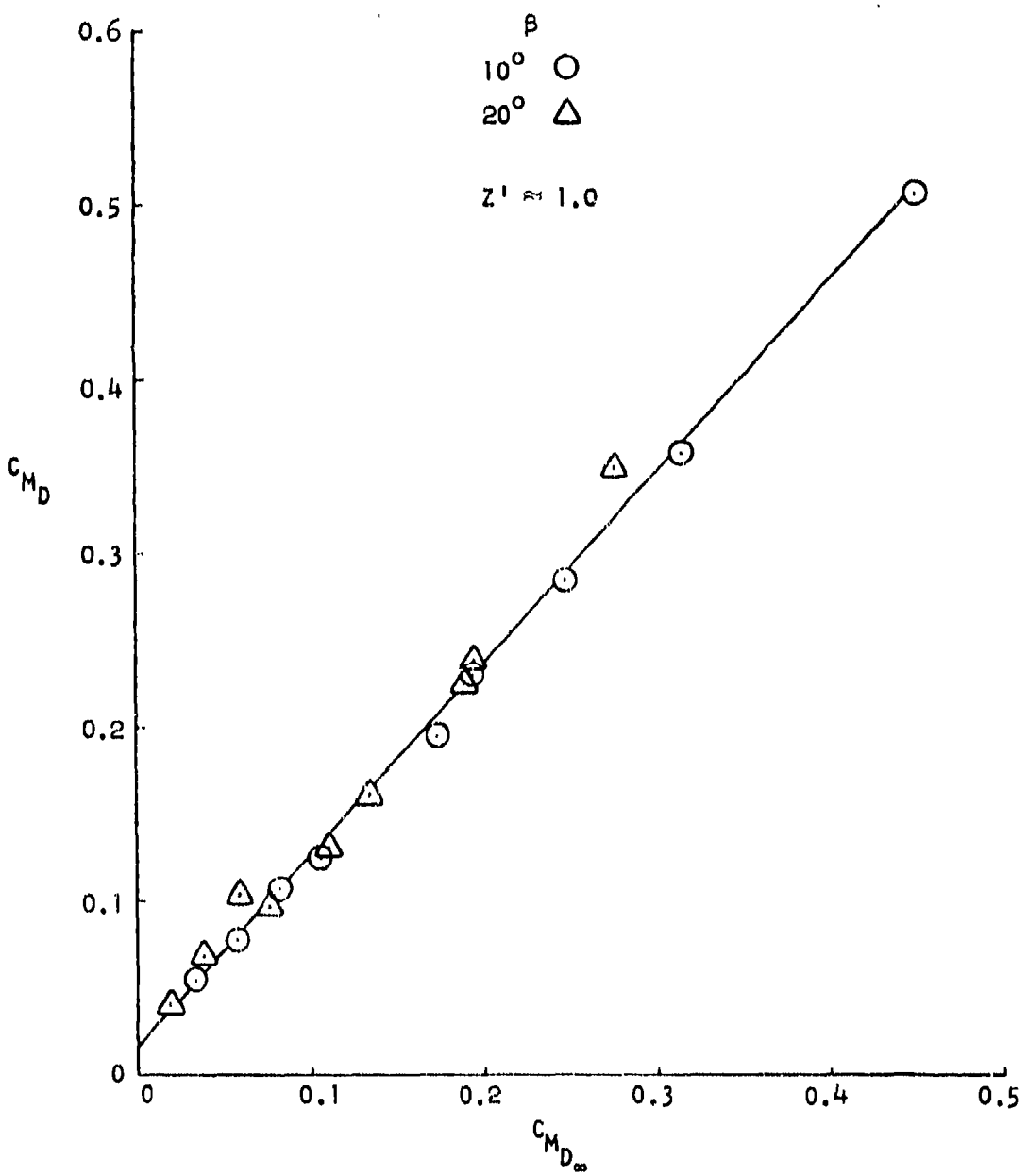


FIGURE 22 MOMENT COMPARISON OF 10 AND 20 DEGREES DEADRISE AT SIMILAR DEPTH